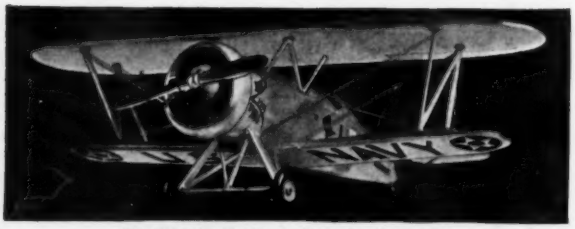
MODEL AIRPLANE NEWS

8th Year of Publication

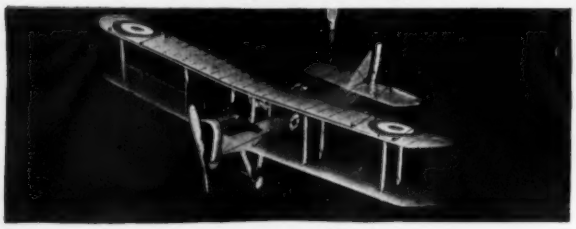
FEBRUARY
1937
20c

"Time Flies"
Capt. Frank Hawks' Racer

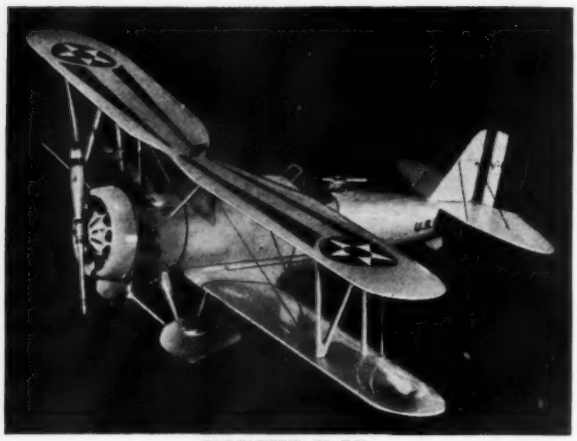
The Most Complete Solid Wood 1/4 Inch Scale Kits on the Market



BOEING F4B-4 (re-designed)



DE HAVILAND 4



VOUGHT V-65

We offer you the following scale model kits (Non-flying)

Each Kit Individually Priced

40 Cents Each

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F.E. 2.B. (1915)
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LOCKHEED VEGA
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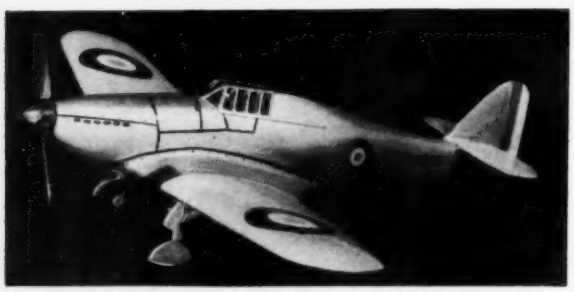
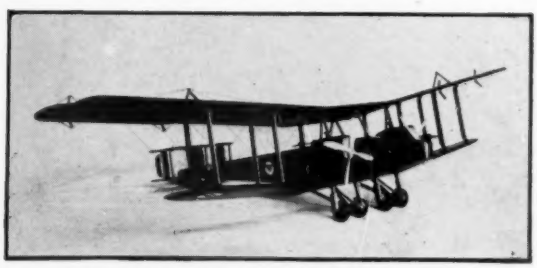


HAWKER SINGLE-SEATER FIGHTER



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NOTE: Add 15% for postage on total order. No order for less than 50 cents accepted. Send remittance with MONEY ORDER only.

DEALERS: Handle the Hawk Line for substantial sales.

Boeing Bomber Kit wingspan 18½ inches, in Balsa $1.00 See Note

Boeing Transport Kit wingspan 18½ inches, in Balsa $1.50 See Note

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Hawk Model Aeroplane Co.
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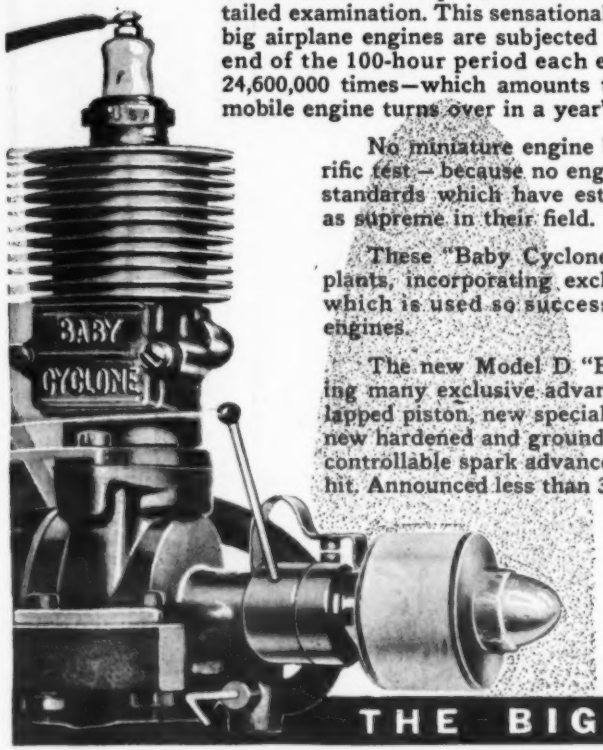
RUNS 100 HOURS WIDE OPEN

BABY CYCLONE SETS GREATEST ENDURANCE TEST ON RECORD

Setting a new world's record under a test which no manufacturer has dared to undertake before, two of the new strictly stock model D "Baby Cyclone" Engines have conclusively proved the outstanding stamina, quality and performance which the engines offer.

Roaring hour after hour with wide open throttle at 4100 r.p.m. these two stock model "Baby Cyclone" power plants completed more than 100 hours each—with a perfect score—before they were shut down for detailed examination. This sensational run—even more gruelling than the big airplane engines are subjected to—took days to complete. At the end of the 100-hour period each engine had turned over a total of 24,600,000 times—which amounts to more revolutions than an automobile engine turns over in a year's operation.



No miniature engine before has ever withstood this terrific test—because no engine is built to the precision-quality standards which have established "Baby Cyclone" Engines as supreme in their field.

These "Baby Cyclone" Engines are PROVEN power plants, incorporating exclusively the rotary valve principle which is used so successfully in the new marine outboard engines.

The new Model D "Baby Cyclone" Engines incorporating many exclusive advantages including new hardened and lapped piston, new special formula, high speed main bearing, new hardened and ground crank shaft and revolutionary new controllable spark advance have already scored a tremendous hit. Announced less than 30 days ago, model builders in every section of the country have been quick to realize the outstanding features of this new engine and have swamped us with orders. Better mail your own order today to avoid delay. Use handy coupon.

$22.25

Special Combination Offer

New Model D "Baby Cyclone" plus Special 13" hardwood propeller, plus the 5 ft. span "California Chief" kit designed especially for this engine. All for only $22.25.

Send the coupon today.

Major C. C. Moseley, Pres.
Aircraft Industries
Grand Central Air Terminal
Glendale, California

☐ As advertised send me postpaid your special offer of new Model D engine at $17.25 plus prop and kit at $5.00 for which I enclose P. O. money order for $22.25.

☐ Send me engine only at $17.25

☐ Send me kit only at $7.90

☐ Send me prop only at $1.50

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THE BIGGEST NAME IN LITTLE ENGINES

8th YEAR OF PUBLICATION

VOL. XVI *No. 2*

Edited by Charles Hampson Grant

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In Our Next Issue

The Evolution of Carrier Aviation, by Gordon Sear Williams, gives you a dramatic account of the development of methods used to launch planes from naval vessels and to subsequently provide a safe landing for them.

Robert V. Smith gives you complete data for building and flying a most realistic flying scale model of England's latest bomber in, **"Build and Fly the Fairey 'Battle'."**

The second installment of **Building a Streamline Gas Model,** by Leo Weiss, will provide gas model fans with information which will enable them to continue the construction of the super streamline gas model described in this issue.

Results of the **Air Ways Design Contest** will appear as well as another fascinating **Navi-Goid Contest,** by E. Semler.

Plans for a scale silhouette model of a **Stinson Trimotor,** by Jesse Davidson, will bring the beginner or expert several pleasant hours.

Photo fans will find valuable hints in **How to Photograph Your Models,** by Gordon Sear Williams.

Many other fascinating and valuable articles and plans also will appear; such as, **Plans for a Speed Model,** by C. H. Grant; **Frontiers of Aviation,** by Robert Morrison; **Designing Your Model for Distance, Gas Line, Air Ways, Aviation Advisory Board** and **3 view plans of the Curtiss YIA-18**

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MORE GOOD NEWS

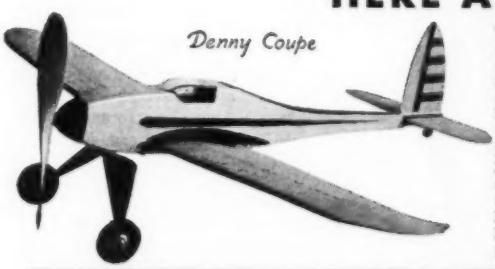
from Reginald Denny

Although we specialize in Gas Kits and Supplies, we have not forgotten the rubber powered models. Here are a few—with more to follow next month.

SIMPLE MODELS FOR BEGINNERS AT 25c EACH

Many beginners have attempted model building only to be discouraged because most of the construction kits on the market are too difficult when one has no knowledge of modelcraft. In this group of kits we offer a progressive course of model building. Starting with the SAILPLANE, a simple tow glider, and continuing in order with the CLOUD CHASER, HORNET MOTH, PURSUIT AND OBSERVATION, it is easy for the beginner to get the hang of things. In the first four named kits all balsa construction is used. All parts are cut to shape, and landing gear is formed. It is only necessary to follow a simple and easily readable plan to assemble these flying models. In the OBSERVATION the beginner is instructed in his first lesson of wing covering with tissue. After building these five models, the student is ready to tackle the other and more elaborate kits.

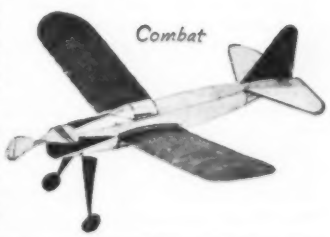
HERE ARE TWO DANDIES!



The DENNYCOUPE has balsa tube fusilage construction found in kits selling for $2.50. If the rubber snaps you don't wreck the ship. Wing span 20-inches. Over power this one a bit and see what a speed ship you have! Rigid construction—built like a battleship! Knock it around and see how it takes it!

No one can design better endurance ships than Monarch. We are proud to distribute the COMBAT, a fleet mid-wing monoplane that gets up there and STAYS up. Easy to build, fine plans, three large bottles of liquids and ample wood.

Each . . 50c



WEST WIND

A record-breaking, cabin endurance model—the finest we have ever seen for the price. Every detail of the entire set-up is a product of skillful designing. Wing span 24-inches. Over all 19-inches. Weight 1½-oz. Cut out ribs, single strut landing gear, assembled free-wheeling, five liquids—and a host of other features. At an exceptionally low price $1.00

$1.00

WE STOCK AND RECOMMEND THE FOLLOWING MOTORS

Brown Jr. 1/5 H. P.	$21.50
Mighty Midget Knockdown Kit	9.85
Gwin Aero 1/6 H. P.	17.50

THE DENNY SKY CHARGER MOTOR WILL BE OUT SOON! ! !

THE SENSATIONAL DENNY JUNIOR GAS KIT

This great husky gas job is unquestionably the biggest money's worth offered today. Only a firm like Reginald Denny could offer this kit at such a low price. ABSOLUTELY NOTHING EXTRA TO BUY to make a complete plane. Finished spun metal cowl, cut out ribs, finished propeller, Ivory silk covering, plenty of dope and cement, full size plans, materials lists, construction hints, pneumatic wheels, extra supplies of wood, balsa, basswood, haskalite, dural and aluminum. **Wing span 6-feet 1-inch. Weight 3-lbs.**

The Denny Jr.

$10.00

Kit Complete, less motor

GAS JOB AIR WHEELS

Red Rubber Pneumatics

3¼ and 3½ in. per pair	$1.50
M & M Heavy Duty 3½ in.	3.50
M & M Heavy Duty 4½ in.	3.75
M & M Lightweight 3¼ in.	1.25
Ohlsson Streamline 3½ and 4½ in.	2.75

GAS JOB ACCESSORIES

DENNY COIL (fits any motor)	$2.00
DENNY CONDENSER	.20
ADJUSTABLE MOTOR MOUNTS (dural, fits any motor)	1.00
SPUN RADIAL COWL, 6½ in. diam.	1.50
MODELBUILDERS CUTTING TOOL	.15
SPONGE RUBBER TAIL WHEEL 1¼ in.	.10

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If he does not stock our line show him this advertisement and ask him to place your order. If no dealer is near you—send your order direct to us. California customers please include 3% sales tax.

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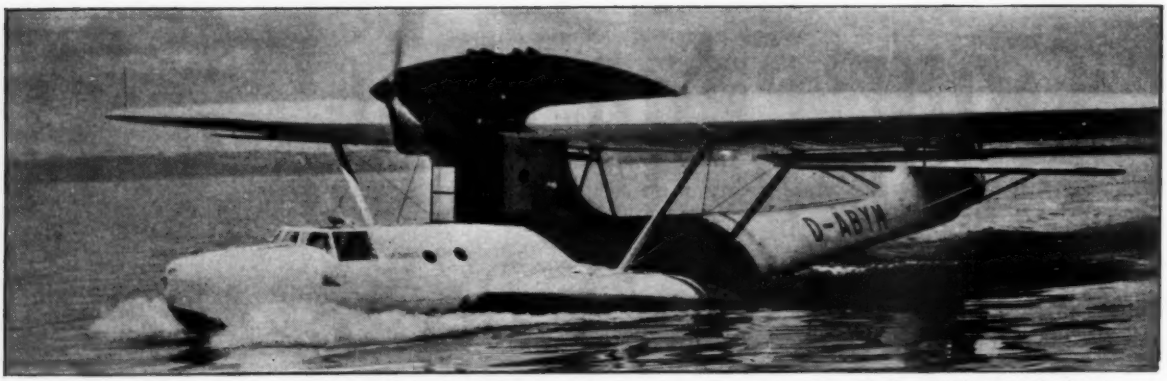


The Diesel-powered DO-18 Lufthansa flying boat that recently flew from Europe to New York. (Wide World Photo)

Germany Spans the Atlantic

How German Genius Has Quietly Solved the Problem of Regular Safe Trans-Atlantic Air Transportation

By FLETCHER PRATT

EARLY in October most of the eastern newspapers carried inconspicuous items to the effect that the German flying boats Zephir and Aeolus had arrived at New York. From the prominence, or rather the lack of it, given to these notices, one might have concluded that the said airplanes had arrived in a box. Actually, one of them hopped there through the air, non-stop from the Azores Islands, more than outdoing the famous flight of Commander Read and the NC boats, while the other made a double jump, from the Azores to Bermuda and from Bermuda to New York. The double hop, unpublicized though it was, means the beginning of the final step in the most difficult air conquest of all—the fight with the stormy and treacherous North Atlantic Ocean.

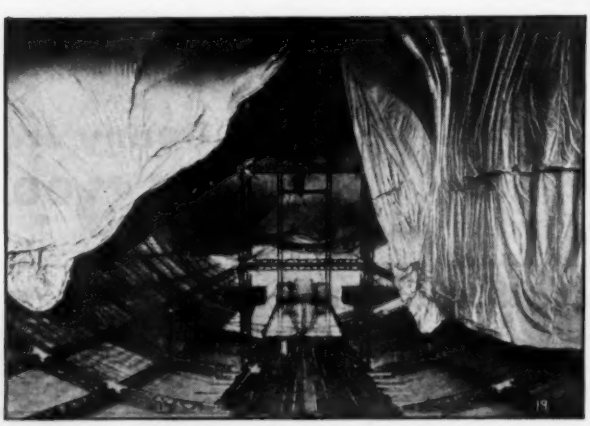
It also marks the culmination of a process that began ten years ago with the emergence from her hangar of the first post-war German dirigible, the Graf Zeppelin. During all those years the Germans have been working patiently and systematically with the object of setting up the first air service between Europe and the United States. Now they have it.

The fact that the Graf Zeppelin has been making the South Atlantic run as regularly as a clock, is generally known. So also, is the fact that the big Hindenburg has been making the hops from Berlin to Lakehurst and back regularly this summer. What is not so generally known is that the big bubbles are a commercial success. The Graf Zeppelin has hardly ever had an empty berth. During the summer of 1936 the Hindenburg made twenty North Atlantic crossings—ten each way—and on every trip but one she carried a full passenger list and could have carried more if there had been room. The one exception was the final trip of the season.

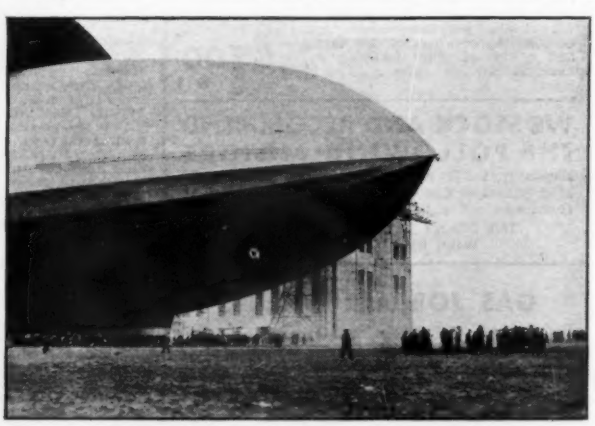
Quartermaster Huchel at the controls of the Hindenburg

In addition the Deutsche Zeppelin Reederei is able proudly to boast that it is the only transportation line in the world that has never lost the life of a passenger nor caused him an hour's delay. The Graf Zeppelin has made just one forced landing in ten years; the Hindenburg none. In other words, crossing the Atlantic in a Zeppelin is the safest and swiftest method of travel in the world!

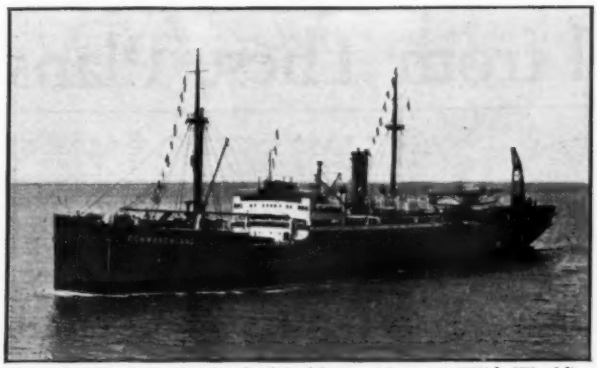
The public, after a long period of doubting the Zeppelins because of the repeated naval airship disasters in this country, England and France, is beginning at last to realize the fact that the big dirigibles are perfectly all right when handled by



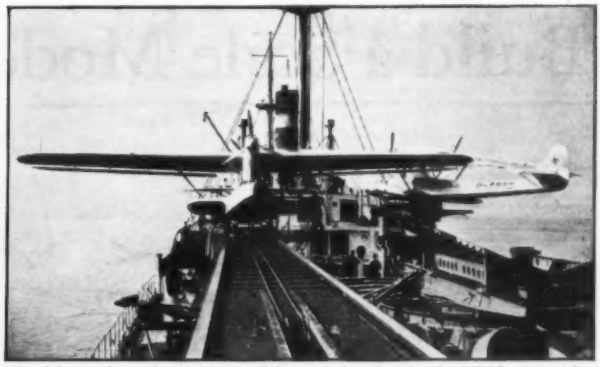
The catwalk and gas cells inside the Hindenburg



The Hindenburg "comes out" for a flight



Catapult ship Schwabenland of Lufthansa Airways. (Wide World)

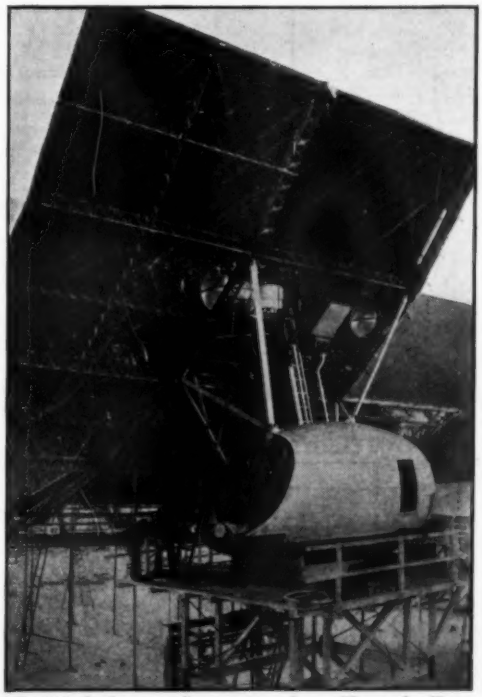


Zephir ready to be catapulted from Schwabenland. (Wide World)

experts and for commercial purposes. And their one year's experience with the Hindenburg on the New York run has so impressed the German authorities that they have now under construction two more dirigibles of approximately the same size. Both of them will be ready for service next summer; one joining the Hindenburg on the New York route, while the other takes over the flights to Rio and Buenos Aires, permitting the Graf Zeppelin to be retired to the status of a training ship. When they come into service, there will be Zeppelin flights across the Atlantic every three days, with trips lasting a trifle over two days—or in other words, it will be slightly easier to fly from New York to Berlin than from New York to Los Angeles.

How do they do it? Let us consider a few statistics first: the Hindenburg, and the two new sausages, are 804 feet long, or about ten per cent less than the aircraft carriers Lexington and Saratoga, which will give a rough idea. They are 135 feet in diameter, or about 10 per cent fatter than the Lexington and Saratoga; are divided into 16 gas compartments which contain a total of 7,082,000 feet of gas. Their pay load comprises 72 passengers each, with 26,500 pounds of mail, freight and baggage (aside from all supplies); they each have four Mercedes-Benz diesel engines, rated at 1200 horsepower apiece.

Incidentally, figures on these engines show the margin of safety under which the Germans work. None of the Hindenburg's engines has ever been opened up to its full power; the Graf Zeppelin once flew half across the Mediterranean on a single motor, and both ships normally cruise at only 65 per cent of their possible power. The reason for this is that diesels operate more efficiently at cruising speeds, and the idea behind using the dirigibles is not to set records, but to run them as commercial ships, operating to make money. They could have made more money, incidentally, by carrying more passengers this summer; the Hindenburg had room for ten more, but the line itself took up that space with young men it was training for the crews of the new ships.

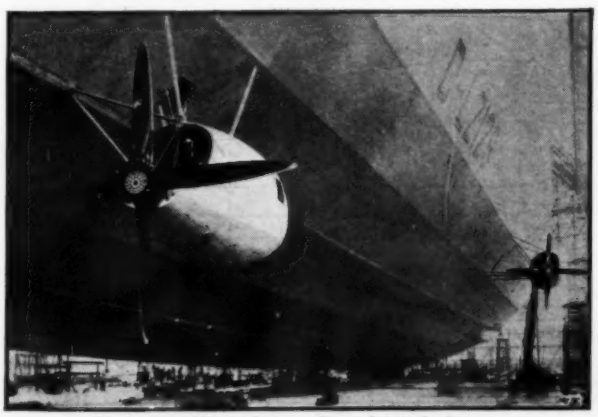


The Hindenburg under construction. (Deutsche Zeppelin Reederei) Above and below

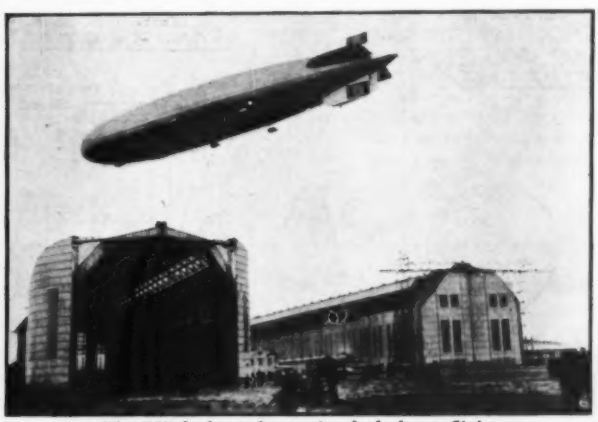
Safety first has been the motto of the Zeppelin commanders, and adherence to this principle explains why the Hindenburg's passengers never have anything to say about bucking storms during their trips. The meteorological department is about the most important element in the navigation of a big airship. From the moment she leaves Lakehurst until she arrives at Frankfurt a/M she receives hourly radio weather reports both from German and American weather departments and fills in the gaps they leave by calling up all the ships known to be making the Atlantic transit and asking what the weather is like where they are. A big weather chart of the ocean lies before the navigator of the ship; on it entries showing storm areas, fog areas, areas of wind or rain, are constantly being entered as the reports come in.

When a storm is located, no matter how large, the Hindenburg simply flies around it. A surface ship cannot do

(Continued on page 36)

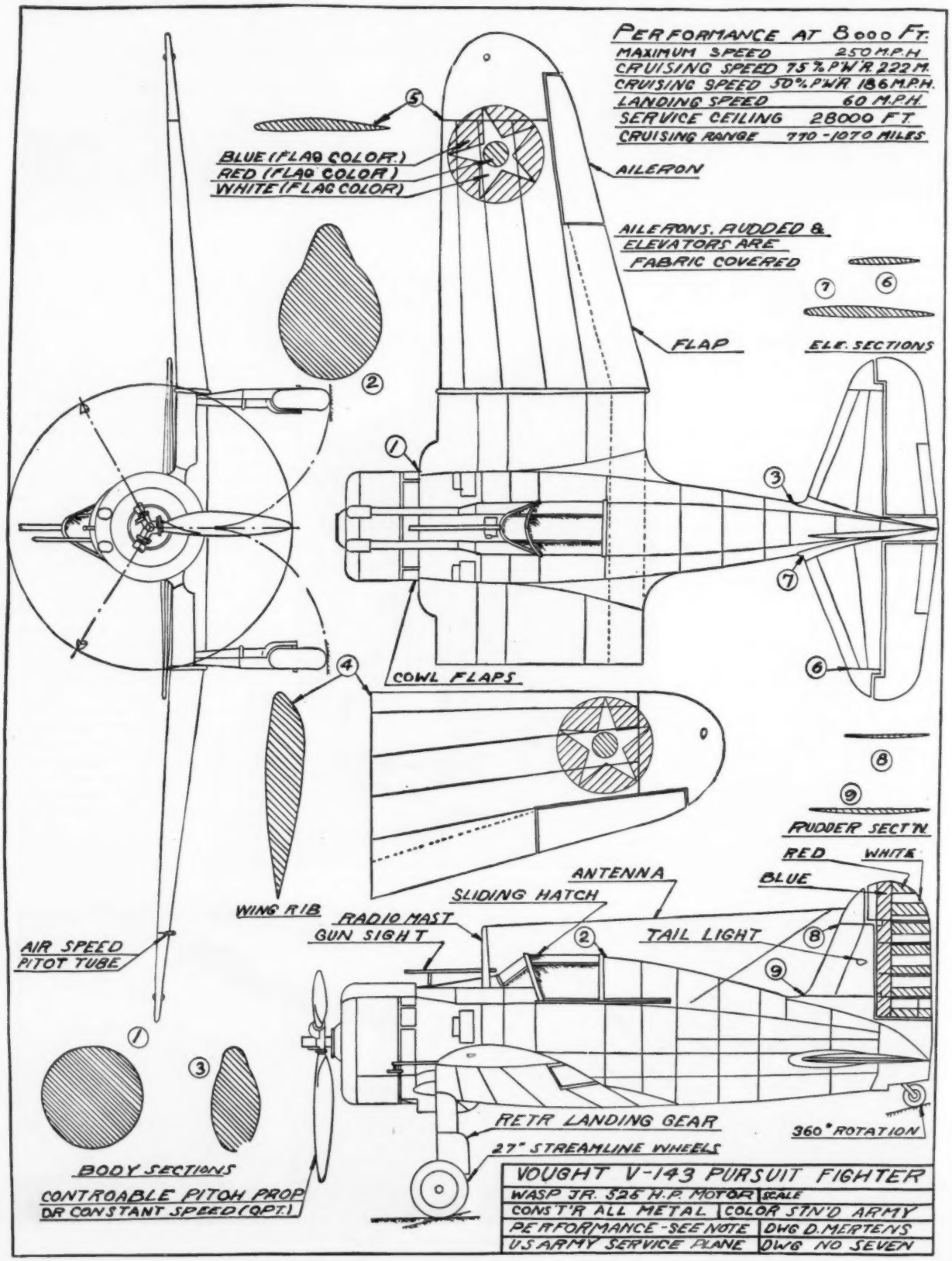


Engine nacelle and propeller of Hindenburg



The Hindenburg leaves its dock for a flight

Build a Scale Model from These Plans



A World Record Hydro

How You Can Build a Class "A" Indoor "Hydro" That Has Remained Aloft Longer Than Any Other Model in Its Class

By VICTOR R. FRITZ

ON NOVEMBER 11th, 1935, at the Philadelphia Model Airplane Association's Second Indeer Meet of the 1935-36 season, William R. Wert broke two junior national records. He flew his class "B" stick model R.O.W. for 9 minutes, 27 3/5 seconds and then flew his class "A" stick model R.O.W. for 7 minutes, 19 2/5 seconds. The junior class "A" time now exceeds the senior time for this particular class.

William R. Wert, 15 years old, is a member of the Caterpillar Chapter of the P.M.A.A. Last season he won the Association's Junior High Point Score Award. He is also a member of the P.M.A.A. National Aeronautic Association Chapter.

The general directions for building this record-breaking ship are:

1—Make a full size layout of the ship.

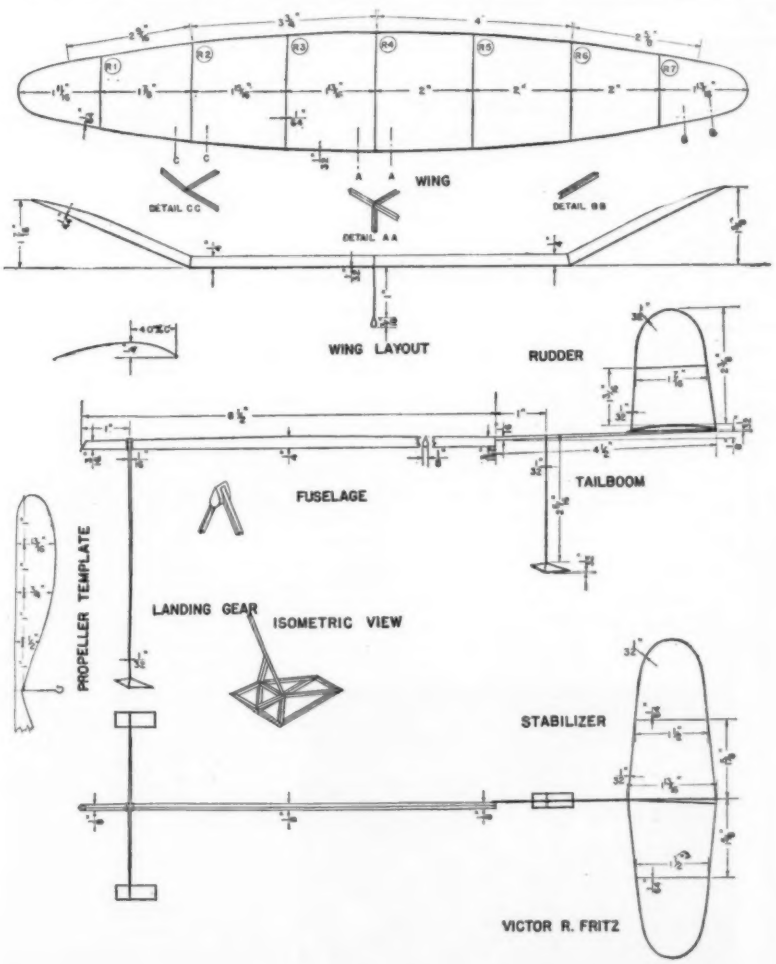
2—Taper the motor stick sheet from ½ inch at the center to ⅜ inch at each end. Shape by bending around "teardrop" form.

3—The wing is constructed in one panel. The dihedral is formed after the wing is covered. The wing ribs are cut to fit, the excess being removed from the rear of the rib. Water is used as the adhesive for the microfilm. The wing struts and clips are cemented in place giving the wing an angle of incidence of 1/64 inch. The rear wing clip is 1/64 inch shorter than the front wing clip.

4—Build and assemble the empennage. The angle of incidence of the tail assembly is ⅛ inch negative. The rudder is covered on the left side and turned 1/16 inch to the left.

5—The floats are made by constructing the sides and inserting the spreaders. Cover with three sheets of superfine Japanese tissue. Waterproof with one coat of banana oil. The sleeve supporting the float struts is reinforced with a covering of Japanese tissue. The sleeve fits snugly over the motor stick 1 inch back from the front. Note the rigging of the floats for efficient take off and minimum drag.

6—The propeller is carved using the regulation method. In laying out the propeller block, the diagonals connect the corners of the block.



WERT'S CLASS "A" R.O.W.

Bill of Material

All measurements are in inches. All members balsa wood unless otherwise specified.

Wing:

2 spars 1/32 round tapered to 1/64 round in 6⅝.

2 spars 1/32 round tapered to 1/64 round in 6 5/16.

2 tips 1/64 x 1/64 x 3.

Ribs:

R1, 1/64 x 3/128 x 1½.

R2, 1/64 x 3/128 x 2 1/16.

R3, 1/64 x 3/128 x 2⅜.

R4, 1/64 x 3/128 x 2½.

R5, 1/64 x 3/128 x 2⅜.

R6, 1/64 x 3/128 x 2 1/16.

R7, 1/64 x 3/128 x 1½.

2 wing clip struts 1/32 round x 1.

2 wing clips .010 music wire.

Fuselage:

1 motor stick 1/64 x ½ x 9.

1 nose plug 1/64 thick.

1 rear plug 1/64 thick.

1 thrust bearing .014 music wire.

1 rear hook .014 music wire.

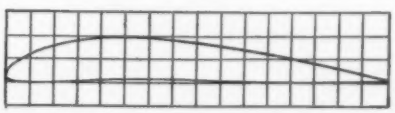
(Continued on page 32)

Wing Section

No. U.S.A.-27

In the July issue of MODEL AIRPLANE NEWS, Mr. Franklin Shea presented data on several types of wing sections under the title, "How to Choose Your Wing Section." Through an oversight the ordinates given for the U.S.A-27 wing section were incorrect. This section is shown below, together with the correct ordinates for the upper and lower contours of the section. This aerofoil section is especially adaptable to "gas" models. It has a high lift and will provide a good rate of climb and excellent gliding qualities.

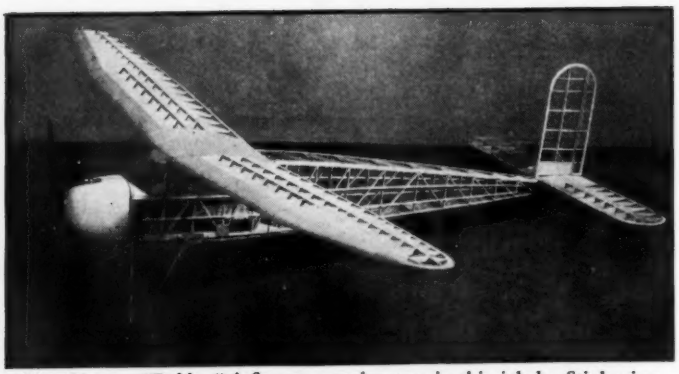
U.S.A 27		
%	UP'R	LW'R
0	1.77	1.77
1.25	3.80	.50
2.5	5.07	.36
5.0	6.94	.19
7.5	8.22	.10
10	9.19	.02
15	10.50	.10
20	11.37	.36
30	11.97	.93
40	11.68	1.14
50	10.86	.75
60	9.54	.28
70	8.08	.06
80	6.10	0
90	3.69	.12
95	2.26	.33
100	.67	.65



"Gas Lines"

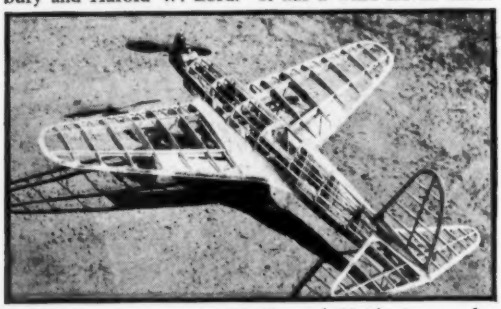
Latest News and Developments in Gas Models from All Parts of the World I.G.M.A.A. NEWS

The I.G.M.A.A. pin. (Exact size)



Pict. No. 1. "Rubber" influence may be seen in this job by Stiglmeier

Pict. No. 2. A perfectly designed gas job built by Westbury and Harold W. Lord. It has a wind-driven timer



Pict. No. 3. A gas model Howard Hughes' racer by Theodore Dykzeul. It's a beauty

Pict. No. 4. Harry Mori's model in winning flight at Salt Lake City, Utah

Pict. No. 6. Herbert Greenberg and the "Red Zephyr" which he designed

HERE is a big surprise for you. Your International Gas Model Airplane Association membership pin is now ready for those belonging to the organization and who may wish one. An exact reproduction of the pin is shown at the head of the column under the title of this article. The pin will be gold with a blue band below the crankcase of the motor, upon which will appear I.G.M.A.A. in gold letters. Write and tell us how you like it and if you care to have one. Further details concerning the pin are given at the end of "Gas Lines."

Members of the I.G.M.A.A. enjoy the distinction of belonging to the first association of gas model builders which has ever existed in the world. For this reason your membership classifies you as a pioneer in the very instructive art and science of gas model designing, building and flying.

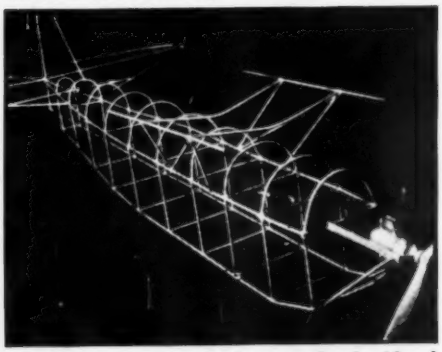
Now we have some interesting news for you from our members. There has been great activity among them and many planes have taken the air since the last publication of "Gas Lines." One member who has produced an exceedingly neat job is Henry W. Stiglmeier of 5115 West 106th Street, Inglewood, Calif. His machine, before it was covered, is shown in picture No. 1. As you can see by examining it closely, the construction is extremely neat and strong. Careful attention has been paid to designing it to take the various stresses encountered during the flight of a gas model. Stiglmeier writes that it is his first gas model and was built in April, 1936. He says:

"The plane has a very good glide and excellent longitudinal stability. However, lateral and directional stability are poor. On first test flights the model flew either to the right or the left without changing the adjustment. Soon after, the dihedral was increased from three inches on each tip to six inches, but there was very little improvement. This helped the lateral stability but not the directional stability."

May we offer a suggestion? After studying the design closely it appears that the stabilizer is set at such a negative angle and such a down pressure is caused on it that it slides to the right or left under the slightest provocation, thus causing directional instability. It is suggested that Stiglmeier set his stabilizer at a slightly more positive angle and see if this will not help to eliminate the undesirable performance.

Another feature about the ship which may be the cause of the trouble is the fact that the center of lateral area is too far above the center of gravity. In fact, this may be the sole cause of his trouble. Anyone who may wish to make tests of his model in order to determine if this is the cause under various circumstances, should cement a vertical fin to the bottom of the fuselage beneath the wing and in this manner increase the amount of vertical or lateral area below the center of gravity. This will lower the center of lateral area. It then may be noted how this added area of the fin affects the flight of the model. The outline of the fin is not important; however it should be longer than it is deep and streamlined if convenient.

Stiglmeier could have improved the flight of his model if he had bellied down the fuselage more than is shown in the picture. Also, if the line of thrust had been raised to a higher point, the stability of the ship would have been improved considerably. Many model builders follow the practice of dipping the line of thrust. Experience has shown that this is a mistake and has caused the action Stiglmeier talks about. Dipping the line of thrust actu-



Pict. No. 7. A gas model frame made of soldered aluminum tubing by T. H. Satterthwaite

Pict. No. 5. Contestants and spectators enjoy the first gas model contest held in Salt Lake City, Utah

ally increases the angle of incidence of the wing, as well as the stabilizer. The angle of incidence of the wing, that is the angle relative to the thrust line, should not be, in any case, greater than 3½ degrees; 2½ to 3 degrees being the ideal condition.

Peter W. Westburg and Harold W. Lord of 315 East Michigan Street, Michigan City, Indiana, send us picture No. 2, which shows their parasol gas job of unusual design, which they completed recently. They tell us that it is their first gas job but it is a development of about a year or more of planning, designing and building. Those who understand gas model design will see from the general design of this ship, as shown in the picture, that it has unusual qualities and that great thought has been given to it. First of all, a parasol wing is used, which gives it exceptional longitudinal stability. The stabilizer is placed fairly high on the fin which helps to reduce the spinning characteristics (if it has any). The line of thrust is high and the center of lateral area is low. In fact, it measures up to every rule in design and should be, from a theoretical standpoint, a perfect flying ship. Unusual structural features are the cantilever landing gear which the builders tell us works perfectly, and the two strut wing suspension with wire braces. Another unusual feature is that balsa shear pins run through the small center section and about two inches into each wing. These break if the plane lands on one wing, and thus the vital parts of the ship are protected from breakage. The ship has a span of 72 inches and weighs only 3 pounds, 10 ounces. The wing loading is .85 pounds per square foot. The power loading is 21.7 pounds per horsepower. Between the landing gear and the bottom of the body is a wind-driven timer which controls the duration of flight up to three minutes.

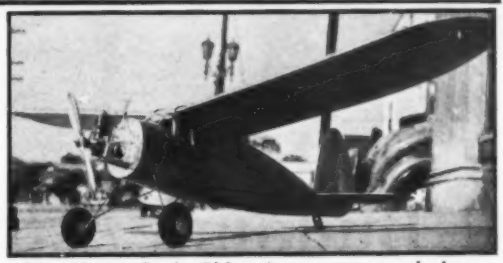
To date the ship has made five successful flights, which the builders say is pretty good considering the kind of weather they had to fly in. These flights do not include the many test flights made. The ship is still in as good a condition as when it was built.

This seems to uphold our diagnosis regarding its design. We are wondering why more builders do not follow proven rules of design and cease building the peculiarly shaped and poorly designed ships which are prompted by convenience of construction rather than careful thought. It is almost inevitable that ships which do not follow certain design characteristics will be short-lived. Considerable has been written about fuselage model design (and this includes gas models) in Mr. Grant's articles during the past four months. This data was given in order to help gas model builders as well as rubber model builders in the design of their ships.

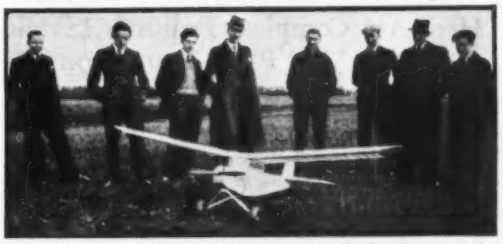
It appears that the west coast builders favor building scale gas models more than fans in other parts of the country. One of the neatest jobs of this type that we have seen is Theodore Dykzeul's new Howard Hughes' racer gas model, which is shown in picture No. 3 before it was covered. Dykzeul lives at Bellflower, Calif. This is not only unique in being designed to scale but it has several features which are very unusual. One of them is automatic flaps, which are slowly lowered when the motor stops. Dykzeul says:

"On the first flight the model was tail heavy. It went up into a steep climb, stalled, came down in a power dive and hit. The propeller and a wing panel were damaged slightly. The second flight was made during a large gas model contest. The plane made a nearly perfect powered flight, banking to the left. After the motor cut out, it started in a steep right bank and when it neared the ground the flaps came completely down and the model leveled out. A wheel caught as it landed in the rough

(Continued on page 38)



Pict. No. 8. Irwin Ohlsson's new motor and plane



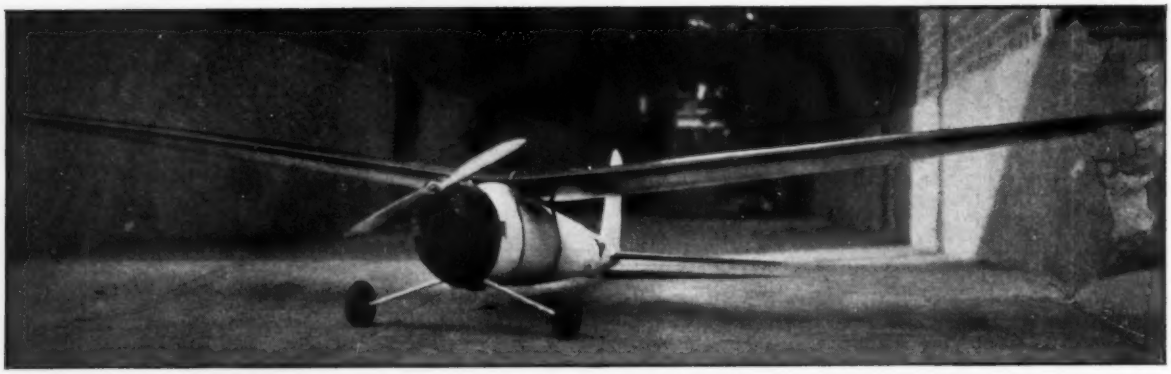
Pict. No. 9. A KG in Belgium, by J. L. Gravenstein

Pict. No. 10. Ken Willard's beautiful midget motor ship which flew across the Ohio River and back

Pict. No. 11. A remarkable flight picture of Mr. Raaff's model flying in Java. (Not slang)

Pict. No. 12. A perfectly designed gas job with streamlined wing mount, by Judson Marsden

Pict. No. 13. An official "fuels up" a gas model at the Anderson, Ind., contest



Note the clean lines and aerodynamic efficiency indicated by this picture of the finished model

Building A Streamline Gas Model

Here Are Complete Building Instructions for a Ship Which Will Place You Among "The Winners."

By LEO WEISS

HERE it is! A streamlined, high-efficiency gas model; an excellent contest plane, and one that embodies full monocoque construction. The "Aristocrat" has no longitudinals in the fuselage constructions, and but two light spars in the wing.

Almost three years ago, the author introduced the process known as "planking" into gas model construction. This was done at the suggestion of Joseph Battaglia, of New York, veteran scale model builder. This planking process being so different from conventional construction, it would be wise for a prospective builder to proceed with extreme caution at first, following details and hints with great accuracy.

Now some word about performance. Distribution of aerodynamic forces brings the center of pressure on the wing about 2½" above the top of the fuselage, and the center of gravity very slightly above the center of lateral area, at the same time about 40% back of the leading edge. These, with the high thrust line, all lend toward a very stable ship in spiral dives and stalls. The "Aristocrat" has been bothered with neither of these faults, although in its one crack-up, it hit in what appeared to be a spiral dive. This was caused by the wing shifting its position in flight.

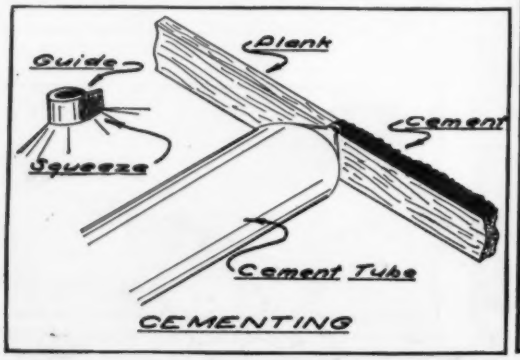
We will begin discussion of the construction of the ship with the tail surfaces. These present the easiest single problem in the entire ship, so they will afford you good practice in this new construction. All the planks used should be of the lightest and cheapest balsa you can get your hands on. This saves both money and weight. Every dealer has some of that soft, brown-spotted balsa so useless in construction of ordinary structures. Get him to cut out your planks, or better still, cut them yourself if you have a circular saw. It is not necessary to make a smooth cut on these planks, because they must be sanded later anyway. As a matter of fact, a rough cut will allow cement to grip so much the better.

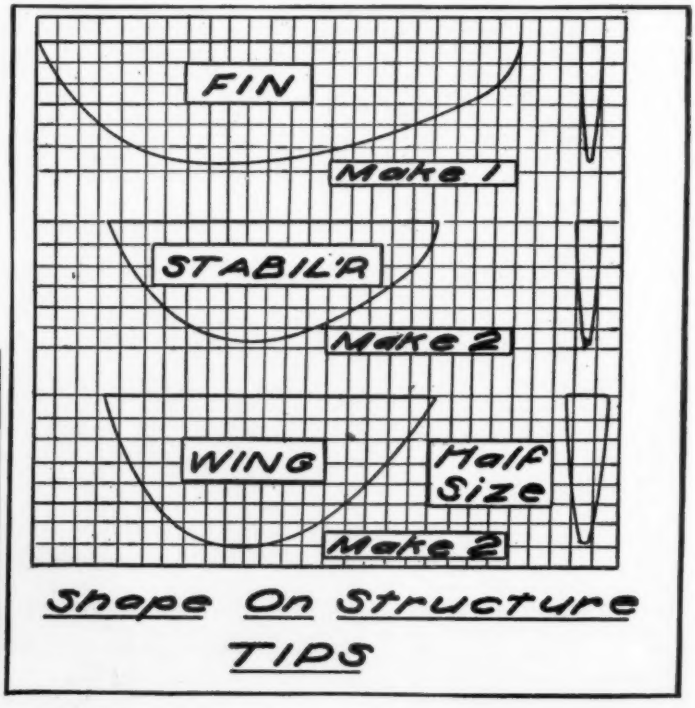
By no means should you use even medium balsa without cutting down somewhat on the thickness of the blanks. Even this practice is not advisable. Nearly all the planks are ⅛" x ⅜" x 36".

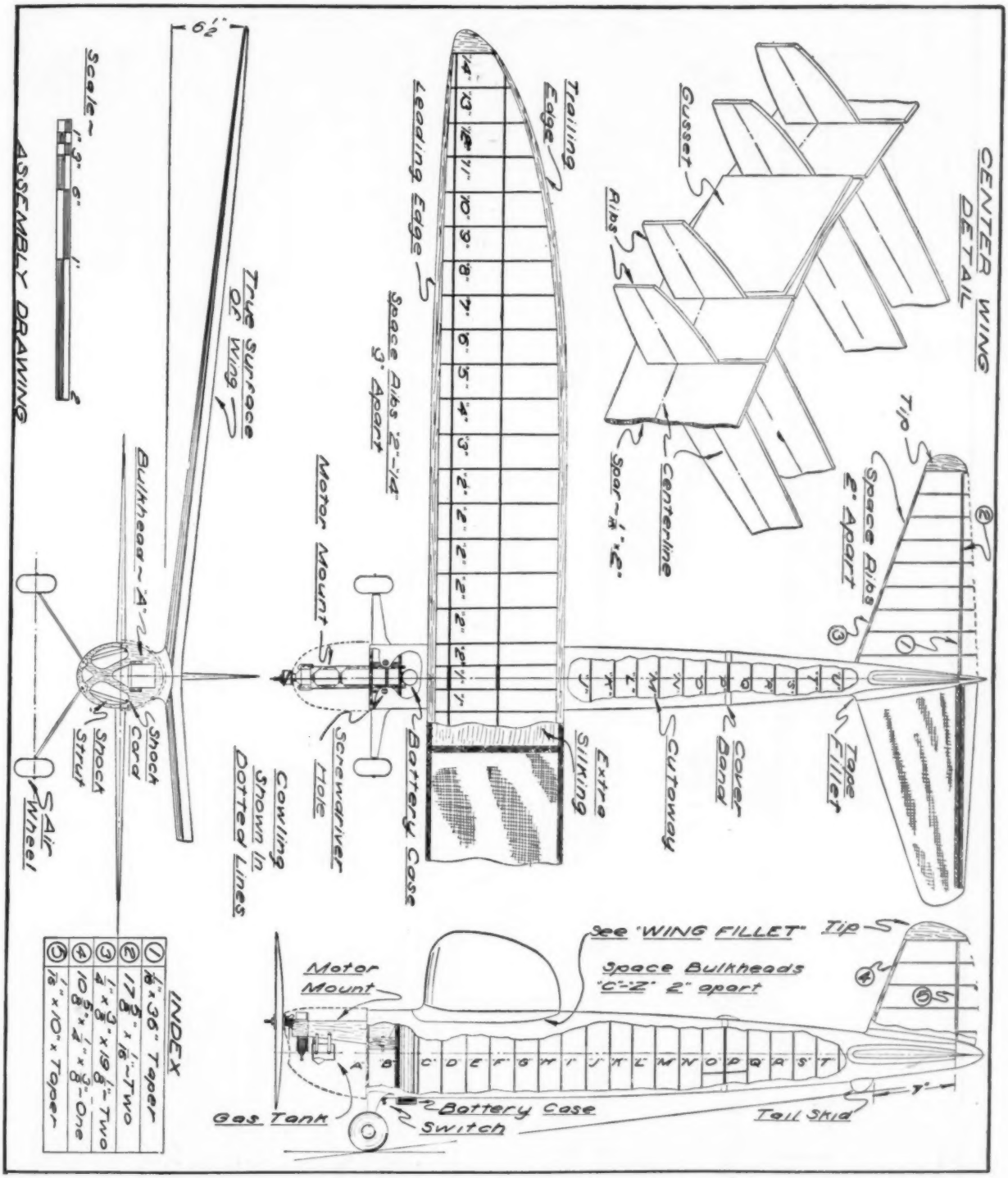
Tail Surfaces

Cut the ribs for the stabilizer and the fin from 1/16" hard balsa as directed in the drawing marked TAIL TEMPLATES. The first rib, at the top of the drawing, shows the approximate thickness of the skin at that point. It tapers slightly toward the tip. The leading and trailing edge are also shown before cutting in dotted lines. You can use this template for the leading edge on the first rib to roughly approximate all the others.

In cutting the ribs, make templates by pasting the drawing to a suitably-sized piece of three-ply Bristol Board. Then cut to the outlines of the largest rib. Trace the outlines on the balsa, making two each with the exception of the center stabilizer rib and all the fin ribs. As you proceed, cut away the templates to the next smaller rib. The trailing edges for the stabilizer





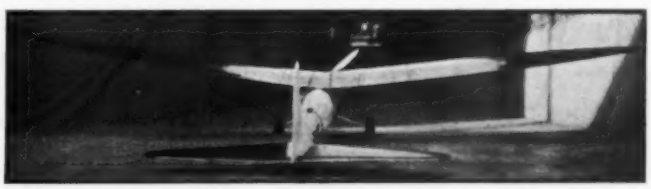


and the fin are cut from the same stock as the ribs. The taper on each is determined by the sizes of the ribs where they meet the edge. This spar should be cut as straight as you possibly can, in spite of the fact that it will not have very much strength.

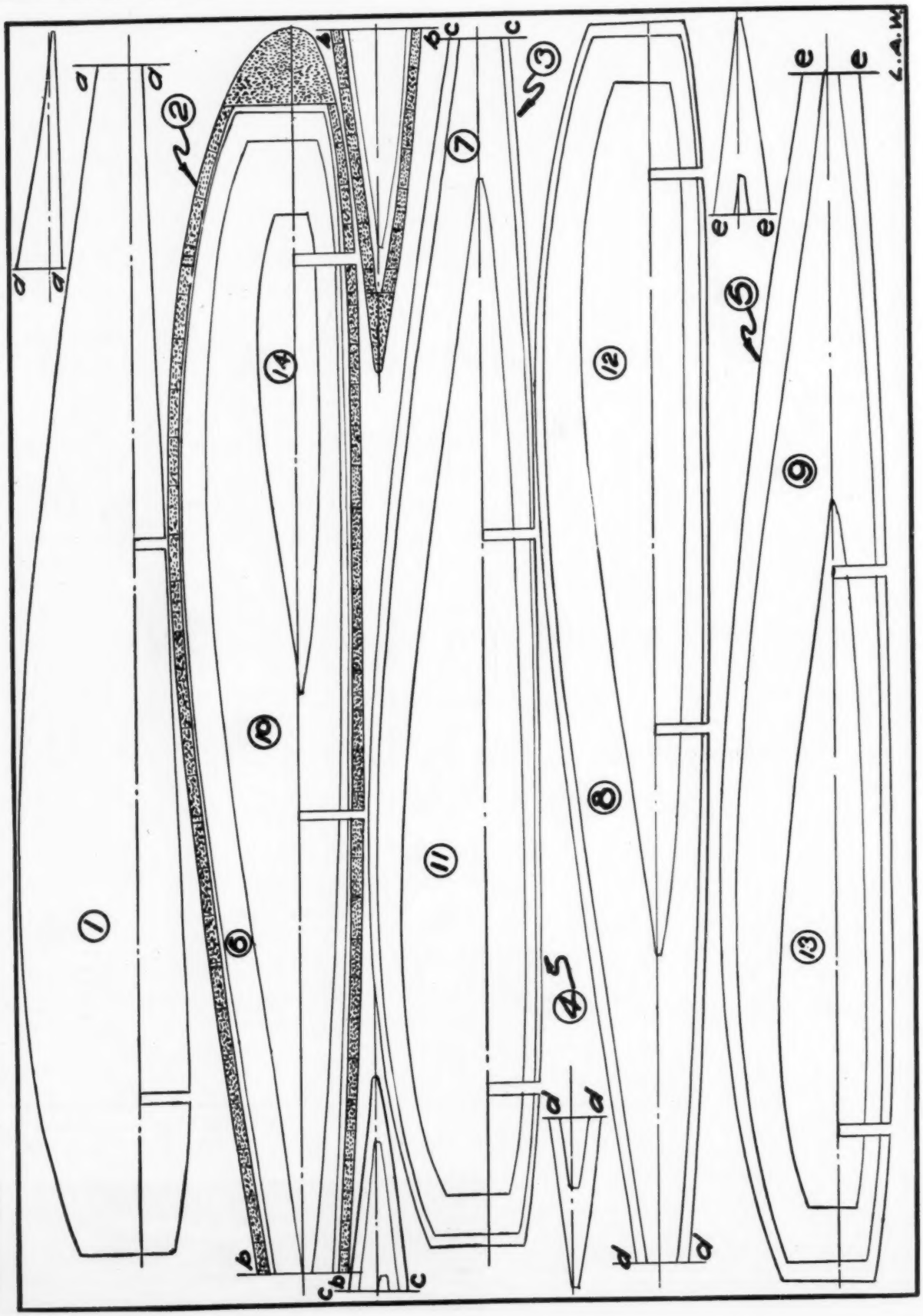
Mark off the center of stabilizer spar, and on both this and the fin spar mark off the rib spacing two inches apart. Without the aid of any jig, cement each of the ribs in its proper place to the trailing edge spars.

The leading edge spars are ¼" x ⅜" soft balsa in each case. They are numbers (3) and (4) on the drawing. Cement these spars to each of the cemented ribs, making

(Continued on page 32)



The rear view shows generous tail area that insures stability


1
2
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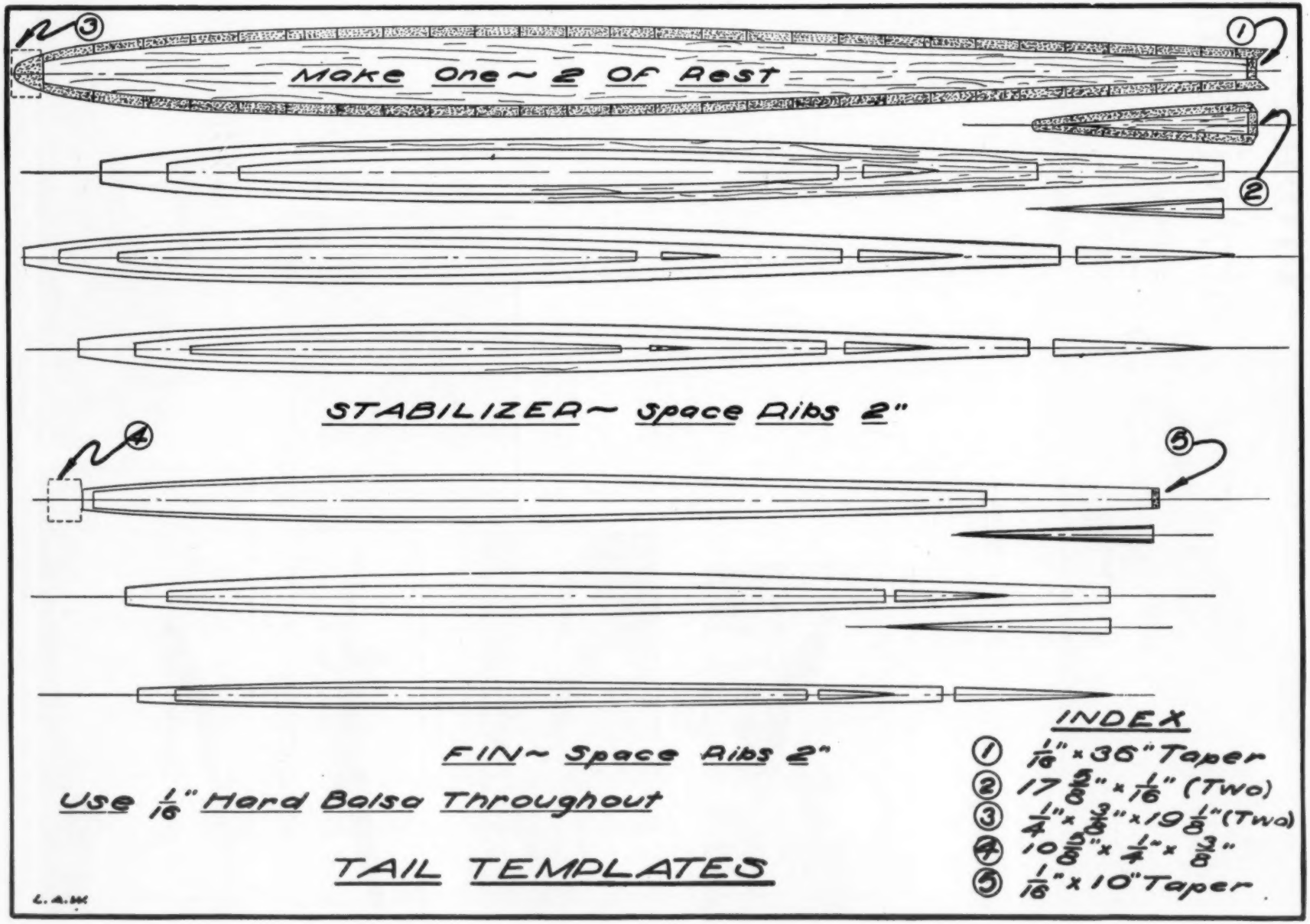
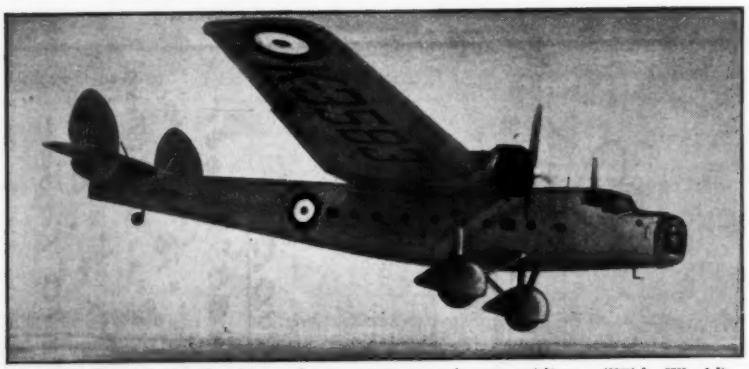
A.A.W.


Make One ~ 2 Of Rest
STABILIZER ~ Space Ribs 2"
FIN ~ Space Ribs 2"
Use 1/16" Hard Balsa Throughout
TAIL TEMPLATES
L.A.W.
INDEX
① 1/16" x 36" Taper
② 17 5/8" x 1/16" (Two)
③ 1/4" x 3/8" x 19 1/8" (Two)
④ 10 5/8" x 1/4" x 3/8"
⑤ 1/16" x 10" Taper

Frontiers of Aviation

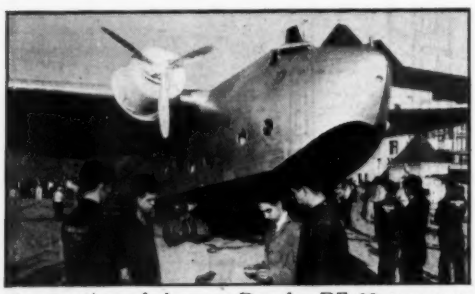
Developments in the Race for Trans-oceanic Transportation and News of the Latest War Aircraft

By ROBERT C. MORRISON



The new Bristol 130 Bomber and troop transport for 20 soldiers. (Wide World)

DOES Europe threaten the United States flying boat supremacy? That is a question frequently heard. Germany has completed many crossings of the Atlantic via catapult and flying boat. Their boats are of the latest Dornier all-metal design, model DO-18. Two Diesel engines in tandem are the power plants. An interesting feature of these boats is the turret structure between the hull and wing. It permits the crew to climb up into the engine nacelles and work on the engines while in flight.



A nose view of the new Douglas DF 32 passenger flying boat taken during its trials

France has for some time been flying the South Atlantic, using various types of flying boats and has just developed a new Loire four-engined design for the service. Though it has many fine features, it seems too small for the large task it has to perform.

England will soon come forth with its Mayo composite flying boat arrangement in which a large flying boat will lift a smaller one into the air and then let it fly under its own power to its destination. Short Brothers, who are building the Mayo boats, have now completed about four four-engined passenger seaplanes for England's Imperial Airways.

In spite of all these activities abroad, designers in the United States have not been idle. Their method of solving the problems of long distance flights such as crossing the Atlantic is to make their boats as large as is possible at the present time. To this writer's mind, the experimentation with catapults as Germany is doing is purely a waste of time as far as commercial service is concerned (the results however may be of use to the German Naval Air Forces). The Mayo experiment is yet to be proven practical, and certainly England's new Short boats are too small for trans-Atlantic service. France has a long way to go before she can catch up with us. Summing up the entire situation, the only real threat from abroad is Germany's proposed Dornier flying boat which will be larger than anything yet built in this line. But by the time it is finished, the U. S. should have boats twice its size if our present rate of speed continues in developing flying boats.

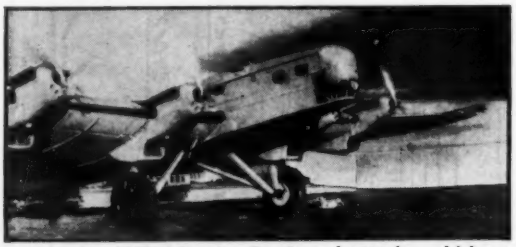
Sikorsky is hard at work on its 50 ton flying boat while Boeing has under construction six 41 ton boats. The Boeings will be delivered to Pan-American Airways when completed late in 1937. They have a wing span of 152 feet.

Length 109 feet
Height 28 feet
Top speed 200 m.p.h.
Capacity:

60 day passengers or 40 passengers as a sleeper. Gross weight 82,000 pounds.

The airplanes will be of all-metal construction with a wing of full cantilever design. Sponsons will be employed instead of wing tip floats. There will be passageways in the wing for the crew to have access to the engines.

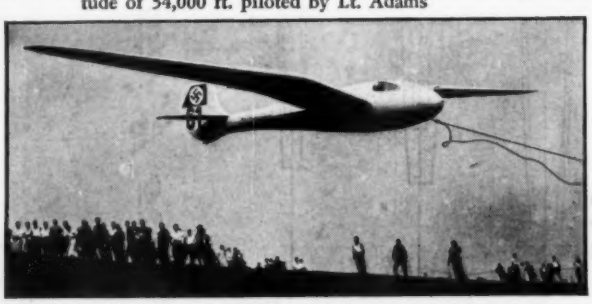
Glenn L. Martin, who it is reported was in competition for bids with Boeing on the



A 4 engine ANT-6 Russian Bomber of 3200 hp. which set new altitude records with five, ten and twelve tons (Sovfoto)

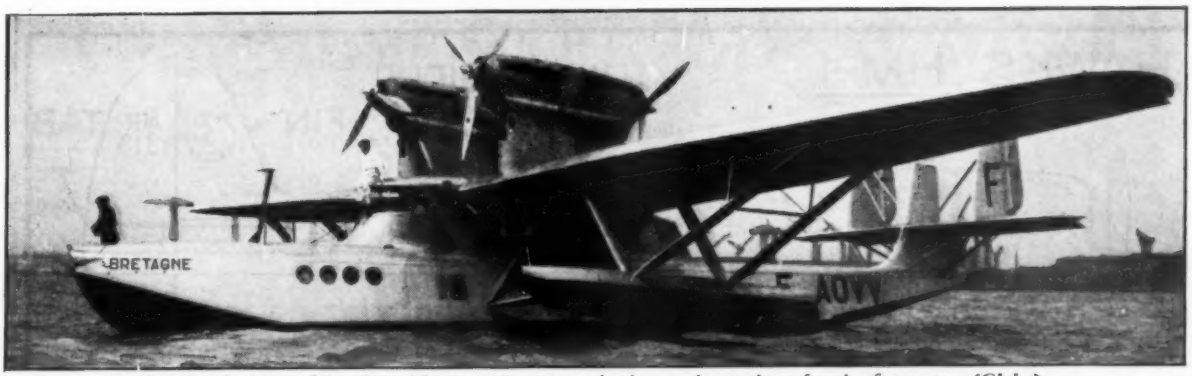
A special British plane that will endeavor to reach an altitude of 54,000 ft. piloted by Lt. Adams

The Koolhoven twin propeller pursuit plane that flies 330 m.p.h.



A launching at the 17th Rhoen glider contest. (Keystone)

Special U.S. Navy Vought SBU-1 for high command officers



The French Navy flying boat "Bretagne," next to the largest in service, after its first tests. (Globe)

above mentioned planes is said to have on order a large flying boat for Russia.

Sikorsky, Martin, Consolidated, Boeing and Douglas as well as one or two other companies are now contemplating enormous flying boats that will be five times as large as our present ones. Mr. Klinehans of the Douglas concern predicts that within twenty years his company will have built a flying boat weighing 1,500 tons! It will carry 500 passengers as equipped for trans-Atlantic service. The wing span will be 550 feet and the single hull will be 375 feet long. Mr. Laddon, responsible for the design of Consolidated's flying boats, is also working on an airplane of similar huge proportions and contemplates the use of two hulls slung under the gigantic wing.

On October 7th bids were opened by the U. S. Coast Guard for six flying boats. The Hall Aluminum Company, whose president was recently killed in a crash, received the order. They will be biplanes with a cruising range of 2,000 miles and a cruising speed of 110 m.p.h. The total cost of the boats is $709,853. Consolidated was also a bidder as well as Sikorsky. Sikorsky bid $151,778 for each of two, $146,844 for each of three, $144,735 for each of four, $142,626 for each of five and $140,567 for each of six.

The Coast Guard is already receiving delivery of six Viking flying boats.

Douglas notes:

Design has been completed on the Douglas DC-4 and jigs are in readiness for immediate construction of the huge fuselage. As described in former issues, it will be a four-engined low-wing transport. Its four engines will be slightly toed out to prevent the airliner from "crabbing" or "yawing." In other words the four engines, located in the leading edge of the wing, will be set at angles so their props will blow air directly toward the single rudder on the fuselage. Douglas engineers have found after experiencing "yawing" difficulties with the DC-1 that "toeing" the engines will not reduce the speed any appreciable amount. The DC-4 in general will be of the same design as the DC-3. It will have the long slim filleting effect along the top of the fuselage forward of the fin as on the DC-3. The tail surfaces however, will have a slightly different contour. The landing gear will be comparatively short and compact and affords the plane long, low, "rakish" lines when it is on the ground. The first model to be built will have the conventional landing gear, but the ones to follow will probably be of the three-wheeled type with one wheel in the nose. All three will be retractable. Flush rivets will be used for fastening the metal skin. The first few planes will have accommodations for comparatively few passengers in order to have space for several tons of cargo.

The Douglas O-46-As are being completed rapidly. There were about 115 on order for the Army. *(Continued on page 28)*

One of England's latest flying boats, the Caledonian. (Pictures, Inc.)

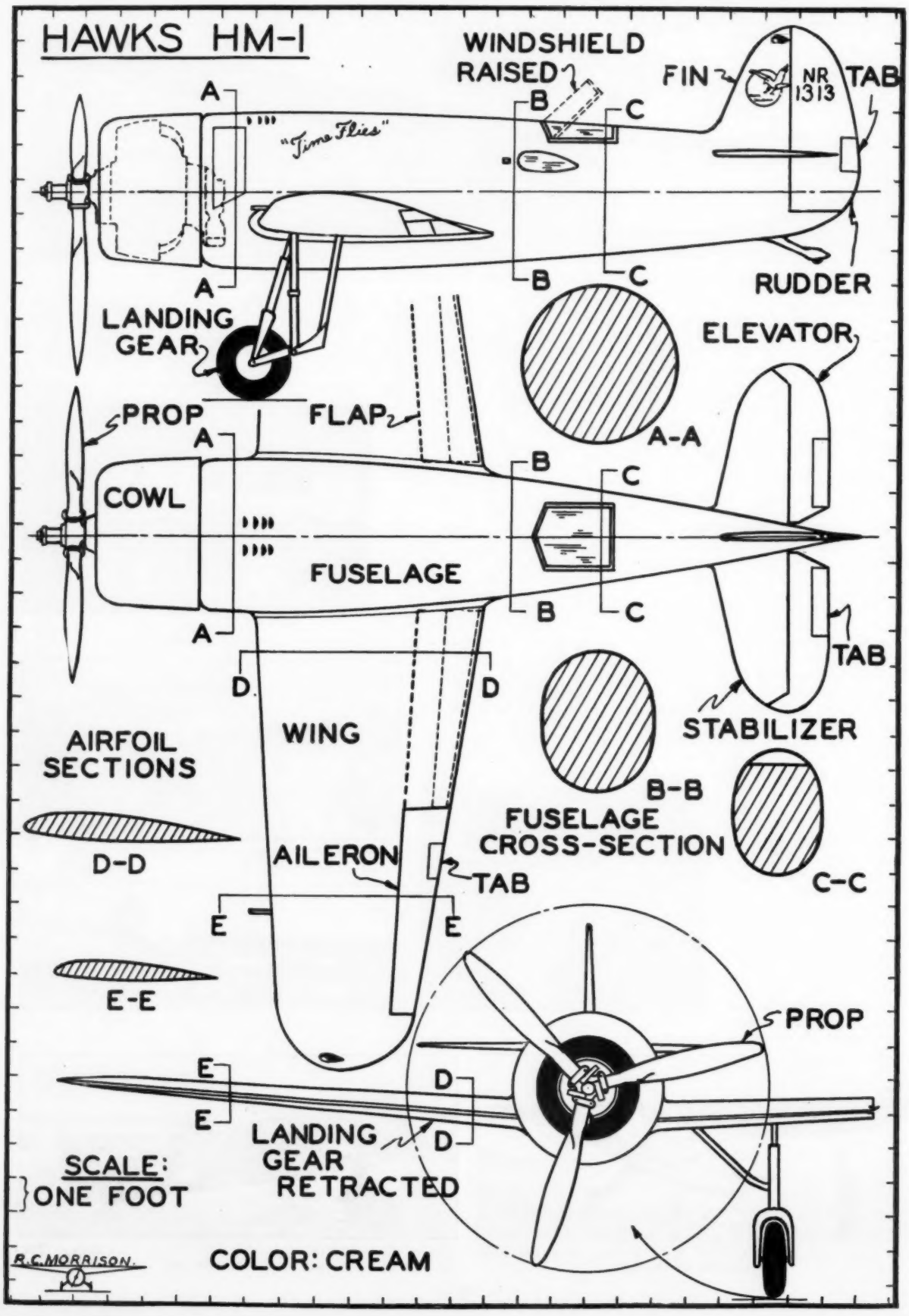
A Russian flivver plane of 19 ft. wing span that flies with a 24 h.p. motor. It weighs 330 lbs. (Sovfoto)

Capt. Mollison's Bellanca in which he flew from New York to Cape Town. (Dallin)

The Brewster SB-A1 with a speed of about 215 m.p.h. Dives of 12 g's have been attained. (Bulban)

The latest Douglas Observation plane O-46A. Over 100 were built recently for the Army

One of the latest Fokker pursuit ships of low-wing design. The landing gear does not retract but the speed is unusually bigh


HAWKS HM-1
WINDSHIELD RAISED
FIN
NR 1313
TAB
"Time Flies"
A
B
C
RUDDER
LANDING GEAR
ELEVATOR
PROP
FLAP
A-A
COWL
FUSELAGE
TAB
D
WING
STABILIZER
AIRFOIL SECTIONS
B-B
FUSELAGE CROSS-SECTION
D-D
AILERON
C-C
E
E-E
PROP
LANDING GEAR RETRACTED
SCALE: ONE FOOT
R.C. MORRISON.
COLOR: CREAM

Designing Your Speed Model

How to Arrange the Flight Forces and Design the Tail Surfaces of your Speed Model

Part No. 3 — Chapter No. 5

By CHARLES HAMPSON GRANT

Article No. 59

IN the last two articles, No. 57 and No. 58, of this series, the design of speed models has been discussed and the outline of the design of such models has been given in part. In this it was shown how the size of the wing, propeller and fuselage should be determined. The span of the wing was selected as 20 inches, the wing chord 3½ inches, the propeller diameter 8 inches, the tail moment arm 15 inches and the length of the fuselage nose as 7½ inches.

The general proportions of the wing, propeller and fuselage having been determined, the diagrammatic layout of the forces acting on the plane can be made, around which the plane may be designed. The first step is to draw the horizontal line of thrust, Fig. No. 123. At the left end, the propeller may be drawn with the line of thrust as its axis. The center point of the wing should be 7½ inches to the right (or rear) of the rear face of the propeller hub. (The model faces to the left). Draw a vertical line intersecting the line of thrust at this point. As the tail moment arm is to be 15 inches long, a vertical line should be drawn 15 inches to the left of the line which represents the center point of the wing. This last line indicates the center line of the fin and stabilizer. (See Fig. No. 123).

It was shown in previous articles that the center of gravity and the center of lift should be slightly below the line of thrust, and they both should be very close together. If anything, the C.L. should be slightly above the C.G. If the C.G. is located about 1/20 of the moment arm below the line of thrust, the model should have the proper amount of nosing up effect when gliding. The line of thrust being above the C.G. will also tend to prevent the ship from stalling. One-twentieth of 15 inches is ¾ inches, so a dot, representing the C.G., should be made on your diagram ¾ inches below the horizontal thrust line and located on the vertical line which is 7½ inches to the right of the propeller.

In this case if the C.L. is made coincident with the C.G. the wing would have to be placed very low, so locate the C.L. slightly above the C.G. A distance of ¼ inch will be about right. Mark this point ¾", below the thrust line; (¼" above C.G.).

The side view of the wing may be drawn in now. The dihedral is to be such that each wing tip is raised 1 11/16 inches above the high camber point at the center section or wing root. Thus the wing tip should be ⅞" above the point on the diagram representing the C.L. and the high point of the wing curve (camber) at the fuselage should be about 13/16 inches below the C.L. point. The wing cross section at the fuselage should be drawn in on your diagram (Fig. No. 123) accordingly. Then the whole side view of the wing may be drawn in.

Now that the wing is located the outline of the fuselage may be drawn so that the wing root intersects it near its lower outline. The outline of the lower side of the fuselage should be approximately ½ inch below the high point of the camber of the wing section. This allows the fuselage to extend down below the wing ¼ inch or an amount equal to the thickness of the airfoil section. This will allow for the convenient curvature of the fuselage's underside.

The top line of the fuselage should sweep rearward from the nose in a smooth streamline curve which rises to its highest point above the thrust line at the vertical line through the center of the wing. The distance from the top of the fuselage to the thrust line should equal approximately ½ the distance from the thrust line to the bottom of the fuselage. This distance therefore would be ½ of 1 13/16" or about ⅞ *inches.* This would specify that the fuselage should be 2 11/16 inches deep, or about 1/9 the total length of the model.

The position of the top of the fuselage will affect the location of the center of lateral area which cannot be determined definitely until the area of the fin has been calculated and the fin drawn in its proper location in the design. Therefore, as the center of lateral area should be on a horizontal line with the C.G. and slightly to the rear of it, as in Fig. No. 123, the top of the fuselage should be drawn in the diagram only temporarily to be changed later if necessary, in order to cause the C.L.A. to be located in the desired predetermined position as shown in the Fig. The same method should be followed in determining the top of this fuselage as was used when the proper location of the bottom of the *stability model* fuselage was established. (See article No. 39 in the October issue.)

Fin Area

It is now your problem to determine the point at which the fin is to be located and the amount of area it should have to provide sufficient stability without loss of speed and efficiency. Any amount of fin area that may be chosen will reduce the speed of your plane, yet a certain amount is necessary in order to keep the plane on a straight course and in this way make its speed effective in the one desired direction. If too little fin is used the flight will not be straight, and though your model may be fast it will not fly straight from the starting point to the finish line. In such a case its speed is ineffective. A very large fin will provide steadiness of flight but will also cause excessive resistance and consequent loss of speed. Strange to say, a large fin will also tend to prevent the

(Continued on page 46)

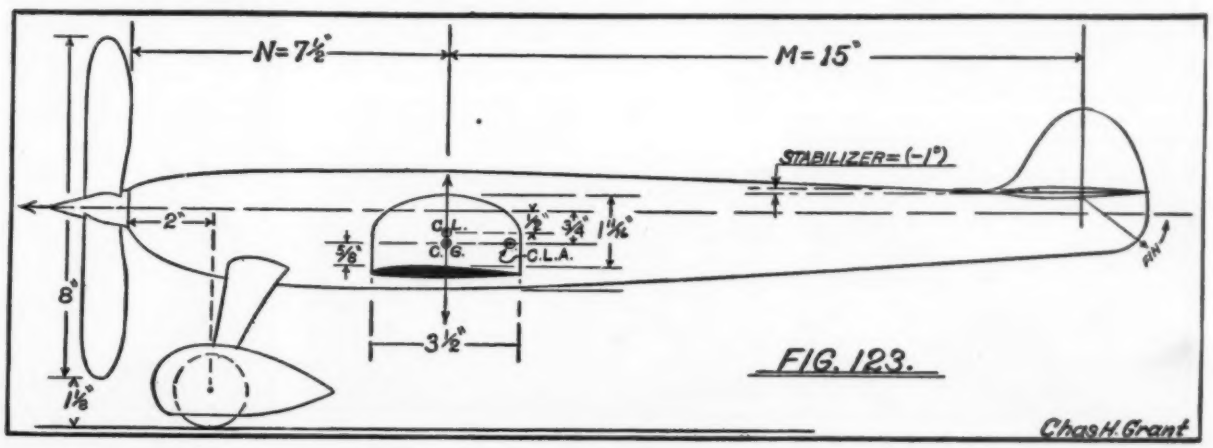
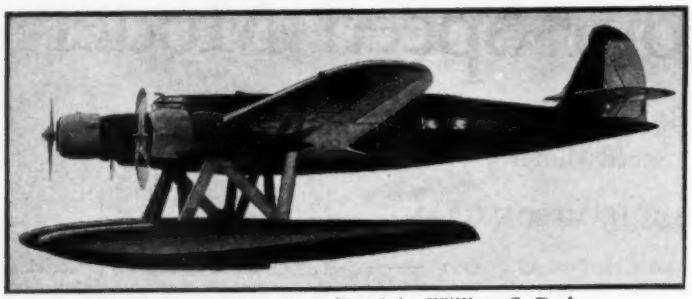


FIG. 123.



The Italian seaplane Cant. Z-506, by William C. Drake

AIR WAYS
HERE AND THERE

What Readers Are Doing to Increase Their Knowledge of Aviation in All Parts of the World. Send Pictures and Details of Your Experiments

Air Ways Club News

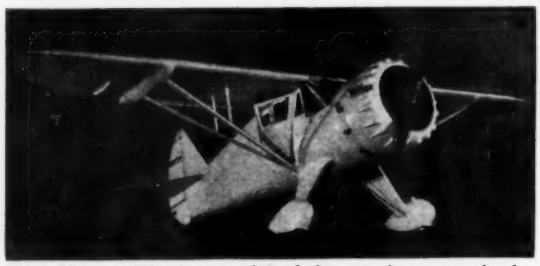
THE second Air Ways Design Contest has been concluded. Because of the study required to give an accurate and detailed criticism of the various entries, it will be necessary to postpone the publication of the results until next month, the March issue of MODEL AIRPLANE NEWS. From the looks of the entries, the comments on them should be very helpful and interesting.

We are pleased to announce that a new unit of the Air Ways club has been formed in Allentown, Pa. The unit is called the Flying Keystone Model Airplane Club and its headquarters are at 1520 Liberty Street, Allentown, Pa. The members are: Richard Metzger, president; Robert Metzger, vice-president; Sterling Schaffhauser, secretary; Russell Fahringer, treasurer; Warren Reichard, Leroy Minnich, Martin Micott, Richard Waidelich, Walter Held, John Clark, Paul Fritz. The sponsors are Ernest Schaffhauser, Kenneth Schaffhauser and Robert H. Kleckner.

The club was formed on August 4th, 1933, as Junior Birdmen Squadron No. 213 but has expanded into the only active model organization in this vicinity. The club is also a chapter of the Philadelphia Model Airplane Association. They held displays in the local stores during the week of December 14th through 19th, also indoor, outdoor, flying scale and standard scale model contests. The club at its meetings, has movies and interesting speakers in order to promote the knowledge of its members.

This month we have many interesting comments and pictures from members in various parts of the world. One of our regular art contributors, William C. Drake of 3 Pine Street, Malden, Mass., presents a drawing of the Italian seaplane, Cant. Z-506. This plane is produced by the Cantieri Riuniti dell'Adriatico Monfalcone. It is powered by three moderately supercharged Piazzio X-R11 air-cooled motors, which gives it a top speed of 192 miles per hour at 5000 feet. Its ceiling is 23,000 feet, range 435 miles. A normal load includes two pilots, radio operator, twelve passengers and 397 pounds of baggage. Inflated rubber boats are standard equipment, being used in case of forced landings.

We hear from Mr. A. B. Fruchey of 448 Center Street, Findlay, Ohio. He is sponsor of the Findlay Model Airplane Club, which has recently become a unit of the Air Ways Club. This club is composed of twenty members who are extremely active. In order to see the type of work turned out by club members, Mr. Fruchey sends us picture No. 1, which shows a scale model of



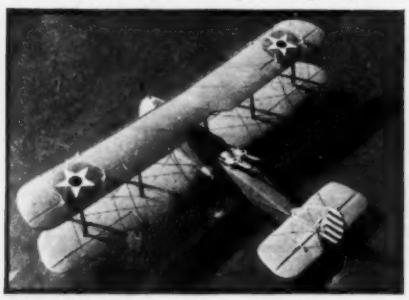
Pict. No. 1. The best model of the month; a completely detailed "Mr. Mulligan" by Richard Jaqua

Pict. No. 2. A detailed model plane that is smaller than the model motor beside it. Both were built by Bill Frey

Pict. No. 7. A Curtiss "Speedwing." by Henry Clark

Pict. No. 8. Janvier O'Hara, winner of the Megow Model Plane Contest and officials

Pict. No. 6. Bob Stetson with his detail scale Martin Bomber



Pict. No. 3. A very fine solid scale model of a wartime D.H.4

Pict. No. 10. A model plane exhibition in Amsterdam, Holland. Note the "Arup" plane

Pict. No. 5. A model Lockheed Vega against a painted background. Both by Gil Minnigh

Pict. No. 15. Busy model fliers at the Marshalltown, Ia., contest

Benny Howard's "Mr. Mulligan." It was built by Richard Jaqua, president of the club, and it required 1500 hours to complete. The cylinders of the motor are made of sheet steel disks. The model won second place in the American Legion Indianapolis Contest. We will look forward with interest to more news of this progressive unit.

Bill Frey of 220 Zara Street, Pittsburgh, (10), Pa., favors us with a picture, No. 2, of a very remarkable piece of work. The picture shows a ⅛" scale model of Al Williams' "Gulfhawk," the span of which is four inches; and opposite it a ½" scale model of a Wright "Cyclone" engine. The details of the little ship are very remarkable considering its diminutive size. It has such details as control horns, control wires and completely built-up motor. The cowling which is ½" in diameter is removable. Both the small motor in the model and the large motor in the picture are complete detailed with sparkplug wires, push rods, cooling fins, etc. The larger motor is approximately two inches in diameter. Both of these models are built almost entirely of balsa wood. This is one of the finest pieces of miniature model work that we have seen.

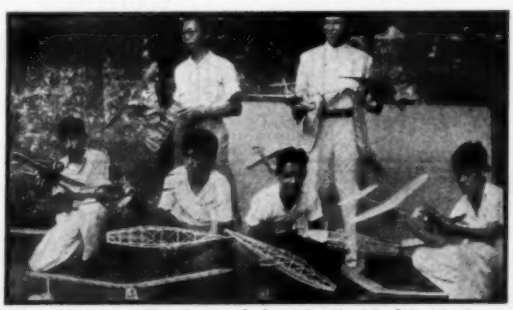
An unusual specimen of solid scale model work is shown in picture No. 3. It is the war-time D.H.4, sent to us by Walter L. Dusenberry of 100 Milk Street, Boston, Mass., who is an enthusiast in solid scale model work. Mr. Dusenberry says that this ship was built by a high school student in Framingham, but he does not give us the name of the young man. Perhaps if the builder reads our comments here, he will favor us with a reply and tell us who he is. The ship as you can see is very realistic and special commendation is being rendered for the manner in which he has attached the guy wires. Usually this is a test of building accuracy and neatness. Solid scale model builders will appreciate this as they fully realize the difficulty one has in attaching the wires so that they are straight and do not look out of proportion. The model is complete with cockpit details and propeller, which is also built to scale.

Frank C. Smith, Jr. of 803 Lovell Boulevard, Houston, Texas, sends us picture No. 4, of his fuselage model which won the $100 American Airlines Trophy at the Texas Centennial Model Airplane Contest. This placed first in the Class C Junior Fuselage event. Smith also won second place in the Class D Fuselage and Class C Stick events. We would say that he "cleaned up." This contest was held on the parade grounds at Dallas, Texas. One flight was timed at thirty minutes, fifteen seconds, but several unofficial flights were longer. The model is unusual inasmuch as the fuselage has a diamond-shaped

(Continued on page 42)

Pict. No. 4. The plane which won the American Airlines Trophy at the Texas Centennial Contest

Pict. No. 9. Young men of Japan launching their model planes at a contest held in Tokyo recently. By courtesy of Muriichi Kitamura



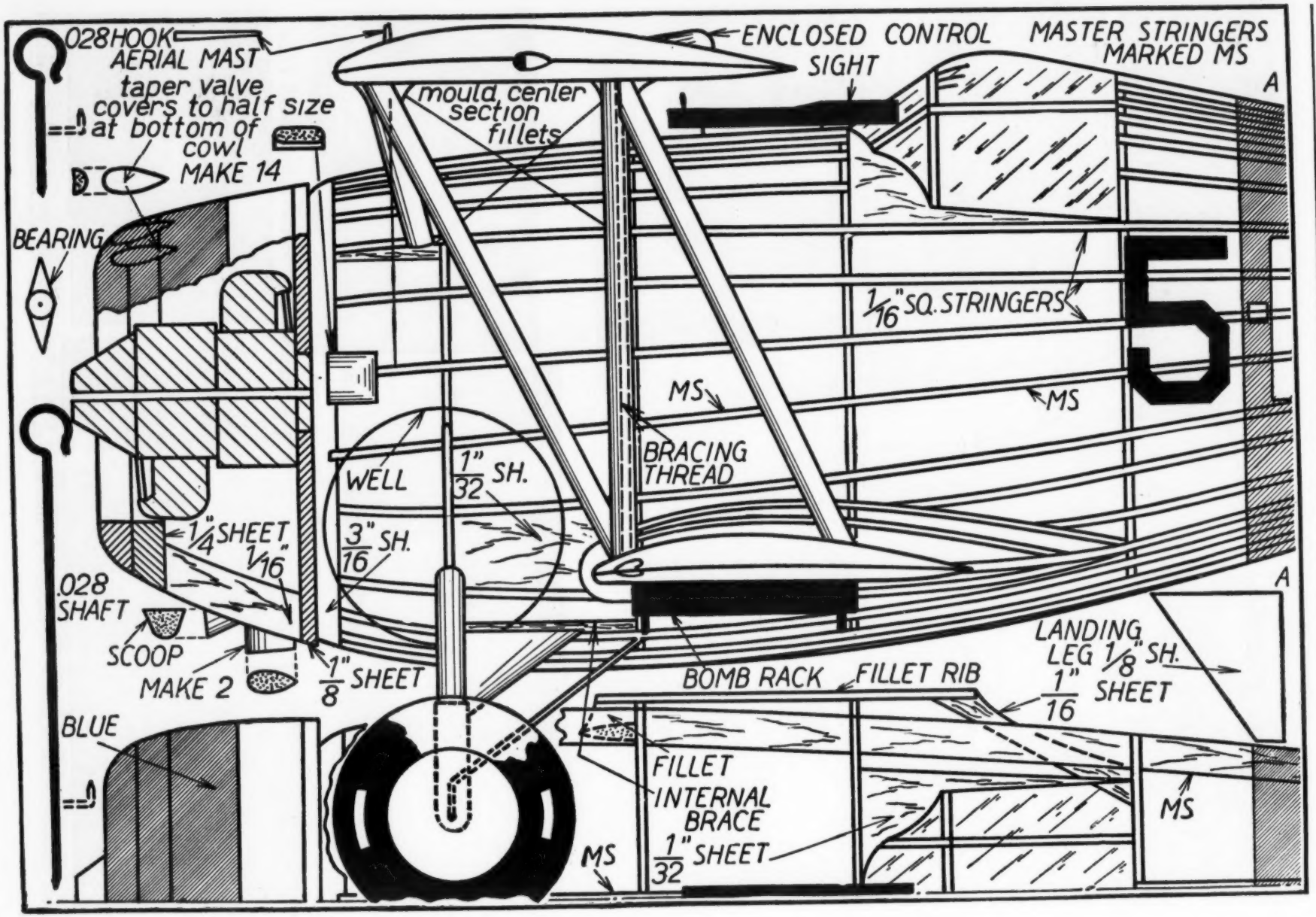
Pict. No. 11. Members of the Manila Model Airplane Club and some of their planes. They are expert builders

Pict. No. 13. An uncovered Northrop "Sky Chief" and its builder, Howard Taylor

Pict. No. 14. L. A. Lymath with his perfect scale Gloster Gladiator

Pict. No. 16. Members of the newly formed Cornwall, N.Y., High School Model Club

Pict. No. 12. A model Northrop Pursuit built by Mr. Harry York of England who attended the 1936 "Nationals"


.028 HOOK AERIAL MAST
taper valve covers to half size at bottom of cowl
MAKE 14
BEARING
ENCLOSED CONTROL SIGHT
MASTER STRINGERS MARKED MS
A
mould center section fillets
1/16" SQ. STRINGERS
5
MS
MS
BRACING THREAD
WELL
1" / 32 SH.
1/4" SHEET 1/16"
3" / 16 SH.
.028 SHAFT
SCOOP
MAKE 2
1" / 8 SHEET
A
LANDING LEG 1/8" SH.
1" / 16 SHEET
BOMB RACK
FILLET RIB
BLUE
FILLET
INTERNAL BRACE
1" / 32 SHEET
MS
MS

A Flying Grumman Fighter

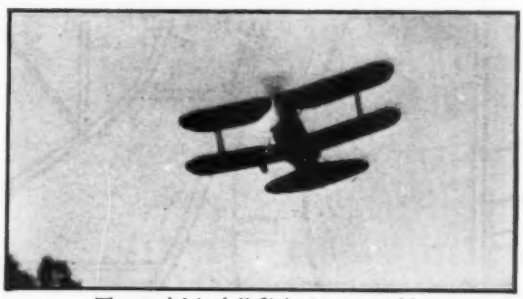
How You Can Build a Model of One of the Latest U.S. Navy Fighters That Is an Excellent Flier

The completed model is faithful to scale and detail

By WILLIAM WINTER

THE Grumman F3F-1 is the latest accepted single-seater of the sturdy Grumman line. Design improvements through two successive models since the F2F-1 have improved the performance. This new machine is one of the foremost fighting planes of the world and because of the excellent combination of structural ruggedness, maneuverability and high speed should prove an awesome foe.

The power plant is the well known Pratt & Whitney Twin Wasp Junior affording the ship a high speed of at least 250 m.p.h. on a total of 650 h.p.

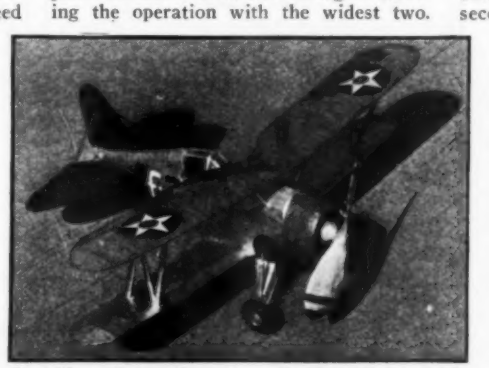


The model in full flight is very stable

The model presents the same pugnacious appearance and stream lines as the full scale plane. The performance for this type of ship is excellent. Needless to say the ability to stand abuse is inherent. In flight its stubbiness and speed are particularly striking. The satisfaction that this model is sure to afford, will amply justify any amount of time and care spent in construction.

Fuselage

The method utilized calls for the use of four master stringers cut from sheet balsa. Trace the side, top and bottom outlines of the fuselage on 1/16" sheet balsa and cut to shape. Mark the positions of the bulkheads on the master stringers. Cut the bulkheads from 1/16" sheet balsa in accordance with the patterns given. The first bulkhead, however, is cut from 1/16" sheet so that it may be curved in to the front as seen on the plan. The No. 8 bulkhead is two ply 1/16" sheet. Cut only the notches for the master stringers marking the others for a later operation. Cement the bulkheads in place on the side master stringers starting the operation with the widest two. When dry, cement the bottom and top master stringers in place taking care that the assembly is aligned as required. Bend the rear hook to shape from .028 wire and insert in the two ply No. 8 bulkhead. Cement the 1/16" sq. auxiliary stringers in place cutting the notches already marked as the work progresses. The cockpit cutout is formed by bending 1/32" sheet balsa. Mark the outline and cut out when dry. Cut the cockpit former from 1/16" sheet and cement in place. Cut two ribs similar to the main wing rib and glue one to the right hand bulkhead fillet extensions and the other to the left hand. Carve the two small fillet blocks, visible on the three main views, from soft balsa and cement in position having first provided the 1/32" sheet mounting as required between the second and third bulkheads. The fillet sheet is also 1/16" sheet balsa. Its pattern may be obtained from the top view. Note that the center section strut joint at the fuselage is reenforced with sheet balsa. The landing gear joint is also strengthened in like manner.



Just like a large plane in appearance. It is a real addition to your fleet

To cover use narrow strips of tissue running the full length of the fuselage. Trim surplus paper after each strip has been attached. The finished covering is evenly sprayed and doped.

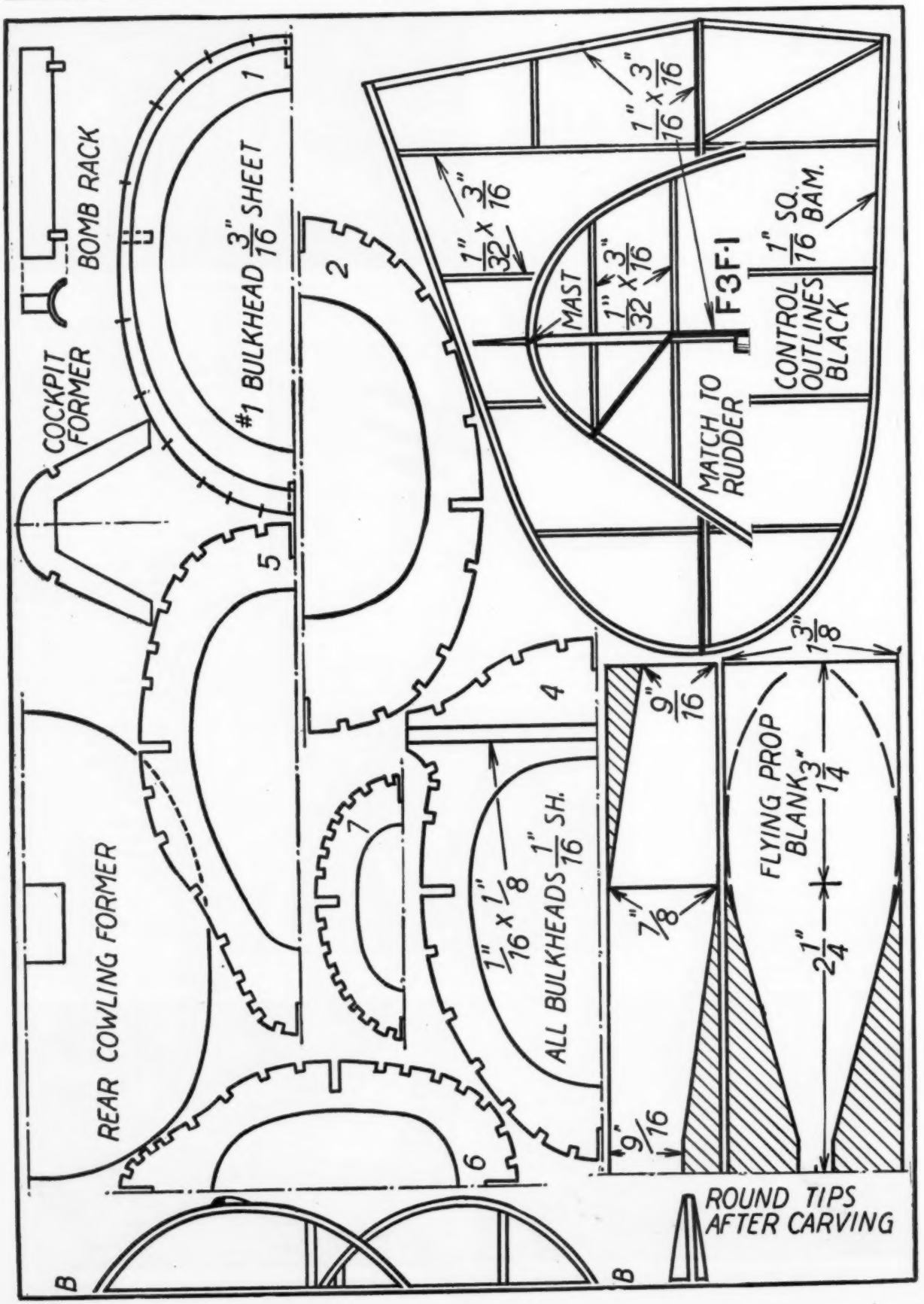
Landing Gear

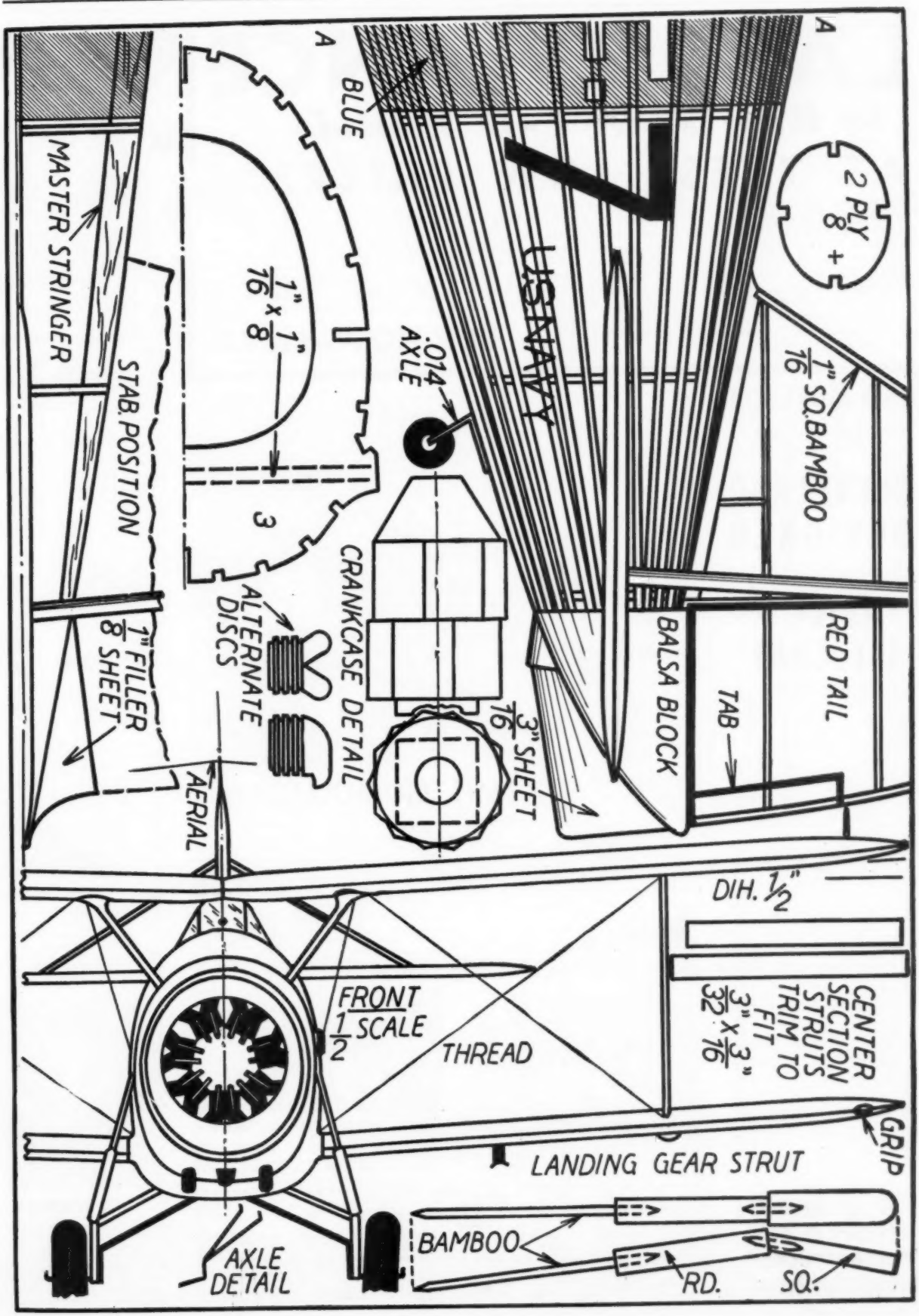
The two balsa triangles are cut from 1/16" sheet and streamlined as

(Continued on page 27)

Launching the ship. Note its steady get away

The motor is wound by pulling out the nose plug


COCKPIT FORMER
BOMB RACK
#1 BULKHEAD 3/16" SHEET
REAR COWLING FORMER
ALL BULKHEADS 1/16" SH.
1" x 1" / 16 x 8
1" x 3" / 32 x 16
1" x 3" / 16 x 16
MAST
F3F-1
MATCH TO RUDDER
CONTROL OUTLINES BLACK
1" SQ. BAM. / 16
FLYING PROP BLANK
3" / 16
7" / 8
9" / 16
3" / 8
1" / 4
2"
ROUND TIPS AFTER CARVING
1
2
3
4
5
6
7
B
B


A
A
BLUE
MASTER STRINGER
STAB. POSITION
1/16" x 1/8"
3
.014 AXLE
USNAVY
2 PLY 8 +
1/16" SQ. BAMBOO
RED TAIL
TAB
BALSA BLOCK
CRANKCASE DETAIL
ALTERNATE DISCS
3/16" SHEET
1/8" FILLER SHEET
AERIAL
DIH. 1/2
CENTER SECTION STRUTS TRIM TO FIT 3/32" x 3/16"
FRONT 1/2 SCALE
THREAD
GRIP
LANDING GEAR STRUT
AXLE DETAIL
BAMBOO
RD.
SQ.

LAST CHANCE

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AT THESE LOW PRICES

The constant rise in raw materials, labor, and general costs compels us to increase our prices on most C-D models—*effective Feb. 1st, 1937.* For some time now we have been absorbing all these increases ourselves—especially to avoid raising prices before Christmas—but now they have reached the point where we are forced to raise our selling prices. Many designs to be discontinued as "open stock" items to be sold as "custom built" kits for which a special service charge will be made. However, we want all our friends, old and new, to have ample opportunity to save money on their C-D purchases, so we are delaying putting the new higher prices (25% approximate increase) into effect till February 1st. Take as many as you can and keep 'em on hand—it's cheaper than to wait and buy them later. No orders by mail postmarked later than Jan. 31st will be accepted at prices shown on these pages—so take no chances. Make your complete selection today and see your dealer, or order direct. Don't delay.

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SAVE MONEY ON

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CLEVELAND DESIGNED

¾-inch scale

"AIR-ISTOCRAT" ★

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SF- 2	Travel Air Mystery	21 3/4	2.95
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SF- 4	Curtiss "Jenny"	32 3/8	2.25
SF- 5	Laird Super-Solution	15 7/8	2.50
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SF- 9	Sopwith SE-5	20	1.25
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SF-13	Spad 13	19	2.25
SF-14	Fokker Triplane	17 5/8	2.50
SF-15	Fokker D-7 Fighter	21 1/4	2.95
SF-16	Albatross Fighter	22	2.50
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SF-19	Supermarine S6-B	22 1/2	2.50
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SF-21	Hawk P6-E Fighter	23 5/8	3.25
SF-22	Macon Fighter	19 1/8	2.50
SF-23	Boeing P-26 Pursuit	20 3/8	2.50
SF-24	Lockheed Vega	30 3/4	3.25
SF-25	Curtiss A-8	33 7/8	3.25
SF-26	Heath Parasol	23 1/8	.98
SF-27	Doolittle's Gee-Bee	18 5/8	2.50
SF-28	Monocoupe Sport	24	2.50
SF-29	Boeing F4-B-3 Fighter	22 1/2	2.65
SF-30	Nieuport 28 Fighter	20 3/4	2.50
SF-31	Hall Racer	19 1/2	2.75
SF-32	Boeing 95 Mail	33 1/4	2.50
SF-33	Cooper Swift Sport	18	1.25
SF-34	Fokker D-8 Fighter	20 3/4	2.50
SF-35	Boeing 247 Transport	55 5/8	6.50
SF-36	Lincoln Sportplane	15	.98
SF-37	Waco C Cabinplane	24 3/4	3.25
SF-38	Buhl Bull-Pup	22 1/2	1.75
SF-39	B-J Fighter	25 1/2	3.50
SF-40	Aeronca Sport	27	2.65
SF-41	Vought Corsair V-65	26 7/8	3.75
SF-42	Howard "Ike"	15 5/8	.98
SF-43	Douglas O-38 Obs	30 1/4	3.75
SF-44	Page's Racer	23 5/8	2.65
SF-45	Martin Bomber	53 1/8	8.50
SF-46	Laird Solution Racer	15 7/8	2.50
SF-47	'32 Wedell's W. Wms.	19 1/2	2.50
SF-48	'34 Turner's W. Wms.	19 1/2	2.95
SF-49	Curtiss F11C-2	23 5/8	3.75
SF-50	Curtiss Export Hawk	23 5/8	3.75
SF-52	'35 "Mr. Mulligan"	23 5/8	2.95
SF-61	Seversky Fighter	24	3.25
SF-63	'36 Caudron Racer	16 5/8	2.50

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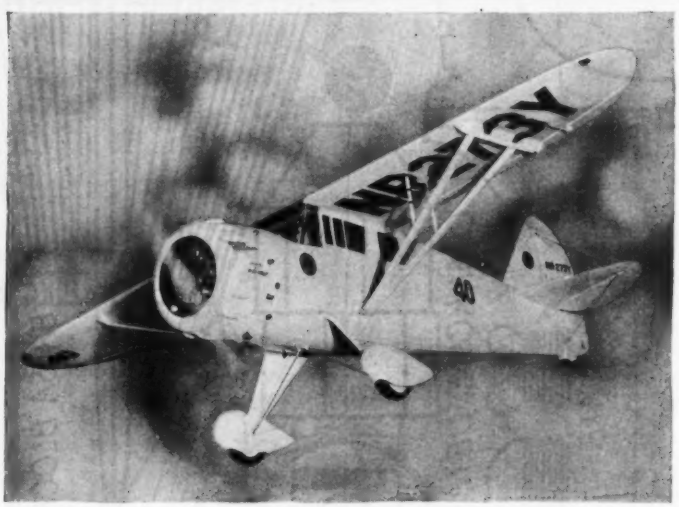
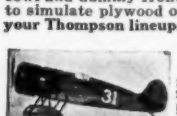


1935 WINNER OF THE THOMPSON TROPHY "MISTER MULLIGAN"

This plane was reputed to be the fastest cabin plane made at the time it won the Thompson speed classic and it proved itself by flying over 220 M.P.H., winning the coveted trophy for 1935. Model exterior as detailed as the prototype and all white with gold lettering and black trim. Material supplied for both authentic motor with cowl and dummy fronts—take your choice Balsa, not paper covered, where necessary to simulate plywood or metal. **No other Mulligan will ever be like it for your Thompson lineup.** Span 23⅝". Absolutely complete SF-52, postfree..... **$2.95**



TRAVEL AIR MYSTERY SHIP

Span 21¾". Coloring: red, black scalloping, green trim. Kit SF-2, only..... **$2.95**

TURKEY HAWK

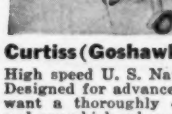
Also Export Hawk. Span 23⅝". Colored: silver and red. Kit SF-50, only..... **$3.75**

Curtiss (Goshawk) F11C-2 Fighter

High speed U. S. Navy shipboard fighter. Designed for advanced modelbuilders who want a thoroughly detailed scale model and one which, when completed, represents the acme of perfection in model building. Span 23⅝". Silver, yellow, gray and red. Kit SF-49..... **$3.75**

1931 : Bayles' Gee-Bee Racer

This stubby little plane won the '31 Thompson trophy race. Had a very short, fuselage which made it very maneuverable flying the pylons. Our model is redesigned and the most accurate model of its type on the market. Wing span, 17⅛". Yellow and black, SF-17..... **$1.95**



GR. LAKES SPORT TRAINER

Span 20". Very pretty. Colored: orange and cream. Kit SF-1, only..... **$2.65**

CURTISS F9C-2

Model sensation of 1933. Keen in detail, looks and flights. Colored silver, blue and red. Span 19¾". Complete kit SF-22..... **$2.50**

Curtiss Hawk P6-E

Colored like Hawks in 17th Pursuit gro... yellow, olive drab, black and white. Our ... designed model is the most advanced ty... to be found anywhere. Many details. Of... built by the best model builders w... "first prize" is sought like our SF-... Fast flights. Span 23⅝". Kit SF-21..... $3.

LOCKHEED VEGA

Span 30¾". Colo... brilliant red, and em... Kit SF-24, only..... $3.

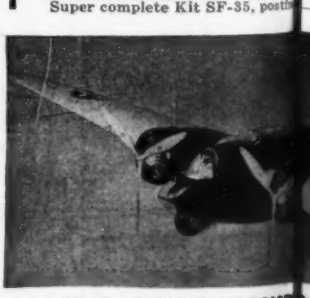
BOEING 95 MAIL

Easy for beginners, span 33¼". Colored: blue and silver. Kit SF-32, only..... **$2.50**

START 1937 RIGHT

BOEING 247 HIGH-SPEED

This model has a span of 55⅝"... on a ... with its two motors powerfully ... It is ... ing. The redesigned model has al... ed wood ... quantity) with data for more ... tic buil... heretofore. Balanced controls, ... e thorc... contains accurate modeling infor... n. Super complete Kit SF-35, postf...



U. S. ARMY HIGHSPEED MA...

Claimed fastest service bomber in w... Span 53... Army yellow, olive drab, details black... vel and ... an almost impossible landing gear ... ot retr... beautifully (and easily) duplicated. N... ever b... 247. Turned Balsa invisible hub wh... y simp... only time-proven efficient methods ... ift-moto... for exhibition. If sold 5 or more year... ould ea... the price. Super complete Kit SF-4... ee.....

CURTISS A-8 ATTACK
Superdetailed. Extremely realistic. A real performer. Span 33", length 24", weight 4.7 oz. Colored yellow and olive drab. Kit SF-25 ..... **$3.25**

VOUGHT CORSAIR V-65
The executive design. Span 26⅝". Colored: silver and blue. Kit SF-41, only **$3.75**

ARMY BOEING P12-E
Popular fighter. Span 22½". Colored: yellow and olive drab. Kit SF-8, only **$2.85**

Speed and flashing performance are designed right in this clever realistic model of the Hughes Racer. It's a peach of a miniature of the 350 m.p.h. super speed flyer—and one that every speed enthusiast will certainly want to build. Retractable landing gear—marvelous streamlining. Don't delay getting it. Kit R-54, complete (except liquids) postfree, only..... **75c**

Famous C-D Boeing P-26
Formerly the XP936. Very popular. Much imitated. The most modern pursuit model of a low wing design. Authentically detailed to the tiniest gadget. Span 21¼". Colored yellow and olive drab. Kit SF-23, A Real Buy! **$2.50**

1934: Turner's Wedell-W'ms Racer
Capt. Roscoe Turner with this ship won the '33 Bendix race and '34 Thompson race. Plane holds record for crossing the U. S. both ways. Forced out of first place in '35 Thompson race due to broken oil line. Span 19½". Wedell-Williams guided. Kit SF-48 ..... **$2.95**

HAWKER FURY
England's Interceptor Fighter. Span 22¼". Colored: all silver. Kit SF-20, only **$2.65**

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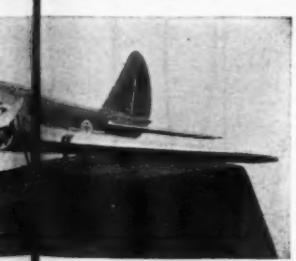
Data for both Executive or Fighter types. Span 23⅞", length 16½", weight 2.7 oz. Blue and silver. Kit SF-7B **$3.50**

WACO C-3 CABIN PLANE
Span 24¾". Colored: silver and red. Kit SF-37, only. **$3.25**

ERONCA C-3 SPORT
...sy for beginners, span ...". Colored: red and ...ver. Kit SF-40, only. **$2.65**

BISHOPS NIEUPORT
Regular steady flights. Span 19⅝". Colored: silver and blue. Kit SF-12, only **$2.50**



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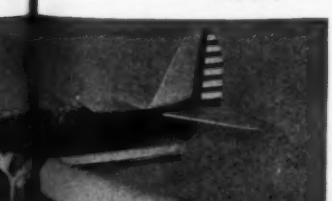
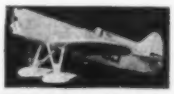
...on a beautiful air performance, ...It is stunning in its gray color-...ed wood printed-out (an enormous ...tic building and appearance than ...e thoroughly engineered drawing ...n. **$2.50**



...HSP... MARTIN BOMBER
...pan 53⅛". Colored: standard U. S. ...vel and strong method of duplicating ...(not retractable). Complicated fillets ...ever before like it—even our Boeing ...simply removing motor spars (the ...ti-motor powering) model is ready ...would easily command twice ... **$8.50**

Howard Racer "Ike"
Good beginners model. Very ornamental as a display model. Flies. Span 15⅝". Colored: all white. Kit SF-42, only..... **98c**



All pictures on these pages (except the Comet and Hughes ★ Illustrate our super-complete 3/4" Scale "SF" Models ★

DeHavilland "Comet" (Dwarf)

The above photograph clearly brings out the elegant beauty of this all red powerful, and fast flying De Havilland Comet Dwarf model, which is very beautifully and deftly trimmed in white with silver propellers and spinners. Wheels are fully retractable. Model creates an imposing sight in flight with both men carefully carved and placed in the cockpit as should be done with these beautiful Dwarfs (as well as our SF) models. The model has a span of 22" and is an unbelievably beautiful little design, leaving little to be desired and at the ridiculously low price for such a high quality model, no model builder should pass up this design to be added to his fleet, regardless of what models he is interested in. Complete Kit, but no liquids, Kit D-51, postfree, only..... **85c**

SAVE MONEY ON *this complete line of*
CLEVELAND DESIGNED
½-in. (Dwarf) scale
"AIR-ISTOCRAT"
Authentic Flying Models

These are precisely like the ¾" models—with a few minor exceptions. For coloring—we recommend the same colors as used on ¾" design of the same model. Remember DWARF Kits DO NOT CONTAIN ANY LIQUIDS, or STRIPING TAPE.

No.	Name	Span Inches	Price
D- 1	Gr. L. Sport. Trainer	13 3/8	$ .65
D- 2	Tr. Air. Mystery Ship	14 1/2	.50
D- 3	DeHavilland-4	31 1/4	.75
D- 5	Laird Super Solution	10 5/8	.50
D- 8	Army Boeing P12-E	15	.65
D- 9	SE-5 (Scout, Exper.)	13 1/4	.50
D-11	A-W Quad Fighter	14	.65
D-12	Bishop's Nieuport	13 1/8	.50
D-13	Rickenbacker's Spad	13 1/2	.50
D-14	Fokker Triplane	11 3/4	.45
D-15	Fokker D-7 Fighter	14 1/8	.50
D-17	Bayle's '21 Gee-Bee	11 3/8	.50
D-18	Howard "Pete" Racer	10	.45
D-19	Supermarine S.6B	15	.65
D-20	Hawker Fury Fighter	15	.65
D-21	Hawk Pe-E Fighter	15 3/4	.65
D-23	Boeing P-26 Fighter	14 1/8	.65
D-24	Lockheed Vega	20 1/2	.85
D-26	Heath Parasol Sport	15 1/2	.65
D-27	Doolittle's Gee-Bee	13 1/8	.50
D-28	Monocoupe Sportplane	16	.65
D-30	Boeing F4B-3 Fighter	15	.65
D-32	Boeing 95 Mailplane	23 1/4	.85
D-33	Comper Swift Lightpl	12	.50
D-34	Fokker D-8	13 5/8	.50
D-35	Boeing 247 Transport	26 7/8	2.50
D-36	Lincoln Sportplane	10	.50
D-37	Waco C Cabinplane	16 1/2	.75
D-40	Aeronca C-3 Sport	16	.65
D-41	Vought Corsair Fight	18	.85
D-42	Howard "Ike" Racer	10 1/8	.45
D-43	Douglas C-26 Obs	20	.85
D-45	Martin Bomber	53 1/8	2.50
D-46	Laird Solution Racer	10 3/4	.50
D-47	'37 Wedell's W. Wms	13	.50
D-48	'34 Turner's W. Wms	13	.50
D-49	Curtiss P11C-2	15 3/4	.85
D-50	Turkey Hawk	15 3/4	.85
D-51	De Havilland "Comet"	22	.85
D-52	"Mister Mulligan"	15 3/4	.50
D-55	Douglas Trans	42 5/8	2.50
D-61	Seversky Fighter	16	.85
D-62	Waco C-6	17 1/4	.50
D-63	Caudron Racer	11 3/4	.50
D-64	Beechcraft C-17-B	16	.75
D-65	Lockheed Electra	27 5/8	2.25

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R-21	Curtiss Hawk P6E	.50
R-52	Mr. Mulligan	.50
R-53	Grumman F2F-1	.50
R-54	Hughes Racer	.75
R-56	Consolidated A-11	.50
R-57	G. L. Sp. Trainer	.50
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R-67	Fairy "Battle"	.50
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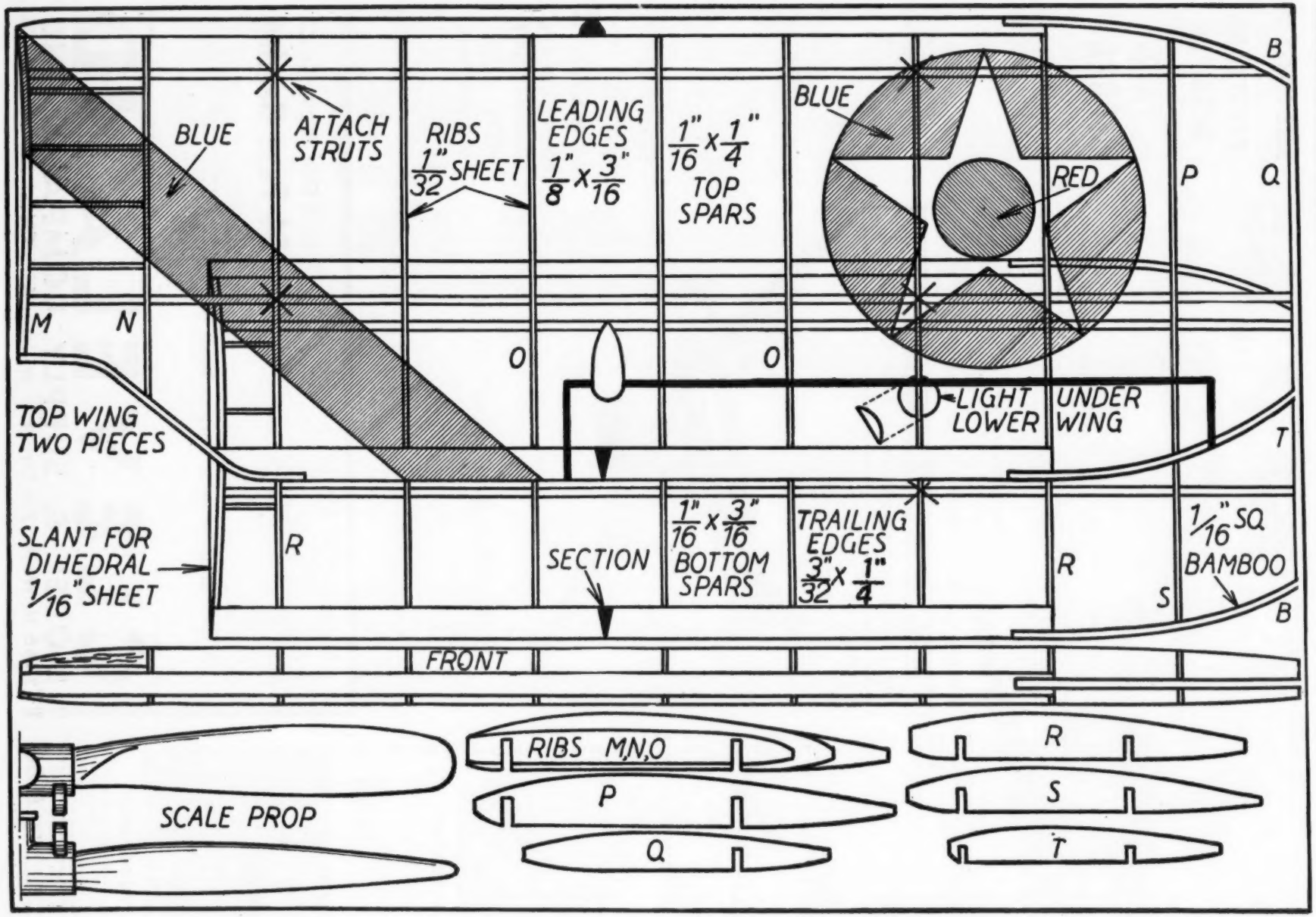
BLUE
ATTACH STRUTS
RIBS 1" / 32 SHEET
LEADING EDGES 1" / 8 x 3" / 16
1" / 16 x 1" / 4 TOP SPARS
BLUE
RED
B
P
Q
M
N
O
O
LIGHT
UNDER WING
LOWER
TOP WING TWO PIECES
T
SLANT FOR DIHEDRAL 1/16" SHEET
R
SECTION
1" / 16 x 3" / 16 BOTTOM SPARS
TRAILING EDGES 3" / 32 x 1" / 4
R
S
1/16" SQ. BAMBOO
B
FRONT
SCALE PROP
RIBS M,N,O
P
Q
R
S
T

A Flying Scale Grumman Fighter

(Continued from page 21)

detailed. The oleo struts are built up as detailed. Note the angles at which the bamboo pegs are inserted in the balsa portion of these struts. The axles are V-shaped and are formed from .028 wire. The fuselage ends of the axles are inserted and glued in the No. 2 and No. 3 bulkheads. The wheels, 1⅞" in diameter, should be the heaviest obtainable to aid in the balancing of the ship.

The ⅜" tail wheel is mounted on an .014 wire axle attached to the fuselage structure as seen on the side view.

Tail Assembly

The tail block is shaped from soft balsa and is cemented permanently in place. The top of the block is rounded to 1/16" width to support the rudder. The streamlined housing for the landing hook is 1/16" sheet.

The spars of both the stabilizer halves and the rudder are cut from 1/16"x1/16" balsa. The cross pieces with the exception of the innermost, which are 1/16"x1/16", are 1/32"x1/16". The edges of all sections are bent to the required shapes from 1/16" sq. bamboo.

To cover use a separate piece of tissue for each side of both stabilizer halves and for the rudder. Attach the paper at the edges only. Spray the semifinished covering with water and pin the sections to the bench until dry to prevent warping. When thoroughly dry, brush lightly with clear dope and attach the units to the fuselage, aligning them with care. The stabilizer has been set at a slight positive angle. The stabilizer braces are cut to the required length from 1/16"x⅛" balsa and streamlined. Cement the ⅛" filler sheets in position between the stabilizer opening and the fuselage.

Wings

The top wing is made in two pieces. The two center ribs are 1/16" sheet. The spars of the top wing are 1/16"x¼" while those of the lower are 1/16"x3/16". The leading edges are 3/16"x⅛" and the trailing edges are 3/32"x¼".

The construction is accomplished in the usual manner. The spars are pinned to the bench. The ribs, with the exception mentioned above and the first rib of each lower panel, are cut from 1/32" sheet. Cement the ribs to the spars. The wing tips and the center section cutout are bent to shape from bamboo. Note that the innermost ribs of all panels are slanted slightly for dihedral. Small pieces of 1/32" sheet are inserted between the first two ribs of each panel to prevent warping when covered.

To cover use a separate piece of tissue for each side of all wing panels. Fasten the edges in place at first. Spray the covering thus attached and pin the panels to the bench until dry to prevent warping. It may be necessary to use small pieces of tissue to cover the tips to prevent wrinkles. When dry, apply a light coat of dope. Rub all frayed edges down with dope.

If the wings have been assembled correctly, the dihedral when mounted will be ½" at each tip.

The light and bomb rack shown on the plan and located beneath the lower wings are constructed of balsa and glued in place.

The hand grip on each lower wing tip may be painted.

The enclosed control for the aileron is nothing but a small block cut to shape and cemented to the covering.

The center section struts are cut to the required lengths from 3/32"x3/16" balsa as are the interplane struts. Cut away a small piece of paper at each of the strut joints so that the struts will come directly in contact with the wood. Cement the center section struts in place on the fuselage aligning them with care. Use pins to hold the work in position until the cement has set. Glue the upper wing in place on the struts. The lower panels are glued directly to the fillet ribs. Check the angle of each to the other and to the plane. Use any convenient objects to hold the wings at the proper angle until the assembly is completed. Cement the interplane struts in position.

Cowling—Propeller—Motor

The cowling as noted is of oval cross section. The front portion is built up of two ¼" sheets as seen on the various views. Do not complete the shaping of these front sections until they have firmly dried together. The rear bulkhead cut from ⅛" sheet has only a square hole cut in it to hold the removable plug in place when in use. Trace the side, top and bottom outlines of the cowl on 1/16" sheet to obtain the four main cowling supports. Pin the rear bulkhead to the bench and glue the four cowling supports in place using pins to hold them in position. To them cement the front portion of the cowling when it is completed. The remaining eight supports are now cut from 1/16" sheet balsa to fit their particular positions.

Cover the cowling with small pieces of tissue taking care to avoid wrinkles. Make 14 valve covers one of which is illustrated on the side view. Cement them when completed around the cowl to fit over the seven front cylinders.

The crankcase is of three pieces. The two rearmost ones are similar to each other and are to be seen on the plan with the side view. They are cemented together so that the cylinders when fitted to the crankcase will be staggered, seven in each row.

The cylinders are built up of scraps, the rocker arm housings being shaped from strips. Use bamboo or wire for the push rods. Note that a square of balsa at the rear of the plug to fit the reception hole in the rear cowl bulkhead is necessary to prevent the wobbling of the plug.

Cut two two-pronged washers from tin using the pattern shown on the plan. One of these tin washers is forced into the front face of the plug to serve as a thrust bearing.

The propeller blank is shown in detail with all dimensions on the plan. The carving is done in the usual manner. However do not round the tips until the carving has been completed. Balance with care after sanding, shaving away enough wood to obtain the desired effect. Drill the hole large enough for the .028 shaft. Bend the front of the shaft U-shaped and force into the prop boss. The extra tin washer already cut is slipped on the shaft and forced into the rear of the hub. Slide a loose washer and the dummy motor on the shaft before bending the rubber hook.

The motive power is eight strands of ⅛" flat rubber.

Flying the Model

It will be noticed that the power is excessive for this size model but it seemed more fitting that our Grumman should not loaf along but should zip with the speed of its big brother. Test over deep grass if possible. If not, wind the ship a few turns and let it run along the ground under its own power. Increase the turns gradually adding weight if necessary to provide the proper balance. As the balance is attained, increase the turns to capacity.

The original model was thoroughly tested proving itself to be an excellent

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flier. It is, however, sensitive to the slightest elevator variation making the balancing operation one to be performed with care. Its sturdy construction and powerful motor causes it to fly as realistically as its prototype. After the usual abuse common to a well flown model, our F3F-1 remains undamaged except for covering.

Bill of Materials

8—1/16" sq. x 36" strip balsa
2—3/32" x ¼" x 36" strip balsa
2—⅛" x 3/16" x 36" strip balsa
2—1/16" x ¼" x 36" strip balsa
2—1/16" x 3/16" x 36" strip balsa
1—1/16" x 3" x 36" sheet balsa
1—1/32" x 2" x 36" sheet balsa
1—⅛" x 3" x 6" sheet balsa
1—¼" x 3" x 12" sheet balsa
1—3/16" x 3" x 6" sheet balsa
2—1⅛" sq. x ⅝" block balsa
1—1" sq. x ½" block balsa
1—½" sq. x 1" block balsa
1—1¾" x ¾" x 1 3/16" block balsa
1—8" x 1⅜" x ⅞" block balsa

Miscellaneous

1 oz. cement, 2 oz. clear dope, 2 white tissue, 3 flat bamboo, .028 and .014 music wire, celluloid, 6 ft. ⅛" flat rubber, 1 pr. 1⅞" wheels, required colored dope or paint.

Frontiers of Aviation

(Continued from page 15)

Construction of the first of the B-18 bomber order has been started by Douglas. These planes will have both a top and bottom retractable gun turret. Two huge doors may be opened in the "belly" of the fuselage in order to drop out two one-ton bombs stored in the center of the cabin. Douglas did not enter the recent Army bomber competitions because they already have more orders for airplanes than they know what to do with. To take Douglas' place was North American with a new huge bombing airplane completed last month.

The second of the DF flying boats is now taking form and many DC-2s and DC-3s are being completed each week. There will probably be more DC-3s built than there were DC-2s if the present flow of orders continues! The last of the Douglas C-33 Army transports are being rolled out of the factory now also to make room for production of the Douglas TBD-1 Navy torpedo planes, 114 of which are now on order.

It has been noticed that on Douglas' three latest designs the wings have been covered with corrugated metal skin. Instead of using the web type spars, strong built-up spars are used to carry all bending loads while the skin only takes the loads in torsion on the wing. The DC-4, however, will use the stressed skin construction.

North American Aviation has just developed another new basic training plane of unusual merit. The Army has ordered 117 of them at a cost of $1,432,600.

Grumman has also developed a new basic trainer and will probably come forth with many other new designs in the very near future.

Vought was sole bidder on October 16th for scout-bombers. Their price was $590,-

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Complete Kit with accurate, detailed drawings and full instructions, including all the 1937 Improvements—

$6.95 Less Motor

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The increased cost of all materials entering into this remarkable Kit makes necessary this new price. But the "Red Zephyr" is still the biggest value in the Gas Model field!

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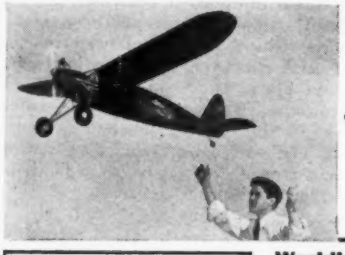

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KNIFE SWITCHES 2 poles.....$.25 3 poles.....$.35

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SHEET BALSA 5 ft. Lengths

1/32x2	$.10
1/32x3	.15
1/16x2	.12
1/16x3	.18
⅛x2	.15
⅛x3	.20
3/16x2	.18
3/16x3	.25
¼x2	.20
¼x3	.25
½x2	.25
½x3	.35

STRIP BALSA 5 ft. Lengths

⅛x⅛	$.03
⅛x¼	.04
⅛x⅜	.06
⅛x½	.07
3/16x3/16	.05
3/16x½	.08
¼x¼	.06
¼x⅜	.08
⅜x⅜	.10
½x½	.12
½x¾	.15
½x1	.18
¾x¾	.15
¾x1	.20
1x1	.25

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FEATURING MOVABLE CONTROLS and BRIDGE-TYPE LANDING GEAR!!

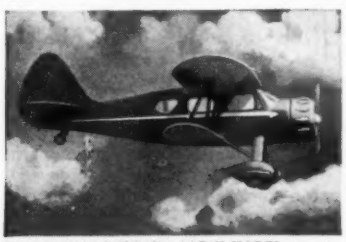
20 in. WING SPAN: GUARANTEED to FLY

Only SCIENTIFIC Kits have all these features!

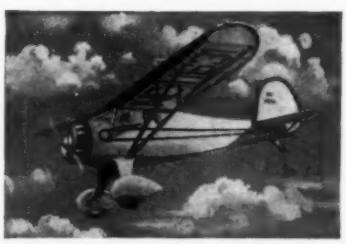
Finished drilled propeller; finished drilled wheels; finished drilled nose plug; turned balsa wood cowling or drilled nose block; finished wire fittings; all ribs; bulkheads, fairings, etc., printed on balsa; 2 sheets colored tissue; banana oil and cement; wire; washers; insignia and wing lettering in colors on gummed paper; live rubber; all strip wood of the finest quality, accurately cut to size; full-size detailed drawings giving every bit of information needed for building and flying the plane, including photographs of the model in skeleton and finished form. Absolutely everything needed to build a flying model airplane.

50c EACH POSTPAID

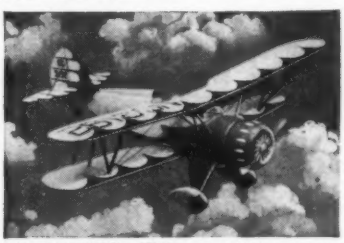
See them at your Dealer



THIS WACO "CUSTOM" CABIN MODEL is the latest design, its prototype being a fast powerful flyer. Beautifully designed fuselage, fairings and clean-cut lines add greatly to its performance. The Waco is considered by many to be America's most popular cabin biplane.



THE MONOCOUPE 90-A has long been the model builder's favorite. It has been in production for a number of years, and each year brings improvements in design and streamlining. This year's model is by far the cleanest streamlined job of them all.



THIS NEW WACO "F-5" is beautiful and unusually well detailed. Authentic as only Scientific makes them. The model is colored white with red scalloping. Many finished parts are included in the kit, among them a balsa cowling. Exciting to build—thrilling to fly. Capable of long flights.

THE CURTISS "HELLDIVER" is the principal fighting plane of the U.S. Navy. Its fine performance and stability in flight are well known to all aviation enthusiasts. Easy to build, a good flyer and very attractive.

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In South Africa: Stratosphere Model Aircraft Supplies, P.O. Box 3248, Johannesburg.

484 for 25 or $906,760 for 40.

Still another basic trainer design has been completed by Stearman, and they are now building $500,000 worth for Brazil.

In the sportplane field business is steadily on the uprise. The Aero Engineering Company, it is reported, is to begin construction immediately on 25 Aeroneers. They also contemplate producing a four-place model, also a two-place trainer design with crew sitting in tandem, affording a very narrow fuselage not much wider than its Menasco power plant. Frontal area will be very small and much speed should be the result. Still another model will be a single-place Aeroneer for various types of use.

Fleetwings' new amphibian, the Sea Bird, weighs only 2,285 pounds though it is built of stainless steel. Spot welding has been employed for joining the joints. That this method of welding will eventually be employed for all aircraft in place of riveting is the opinion of many aeronautical engineers. The major aircraft manufacturing companies throughout the United States are giving this serious consideration. At present spot welding is used extensively on the non-structural members of Douglas' DC-3s.

Specifications of the Sea Bird follow:

Capacity—four passengers
Gasoline—50 gallons
Oil—5 gallons
Baggage—100 pounds
Gross weight—3,415 pounds
Engine—285 hp. Jacobs
Top speed—150 m.p.h.
Cruising speed—135 m.p.h.
Landing speed—47 m.p.h.
Rate of climb—900 feet per min.
Service ceiling—15,000 feet
Cruising range—450 m.p.h.
Wing span—40 ft. 6 in.
Length—31 ft. 5½ in.
Wing loading—14.6 lb. per sq. ft.

The cabin has been sound-proofed to 80 decibels. Drooping ailerons are employed as well as flaps.

Again more rumors appear in the papers about Howard Hughes' racer. Now they say that he will attempt to break closed course speed records set up by Michel Detroyat at the 1936 National Air Races. Hughes has bought a new Twin Row Wasp engine for the plane. Even though its wing span has been increased, Hughes expects his plane to do over 370 m.p.h. The new N.A.C.A. 23012 wing section, improved windshield, and better fuselage streamlining will make this possible.

Like Frank Hawks' new racer, the latest Caudron 461 is minus a windshield, leaving a smooth surface along the top of the fuselage. The 461 is a somewhat smaller racer than Michel Detroyat's Caudron.

Data on Capt. James A. Mollison's Bellanca "Flash" is as follows:

Wing span—46 ft. 2 in.
Length—26 ft. 0 in.
Height—7 ft.
Wing area—279 sq. ft.
Weight empty—4074 lb.
Useful load—4276 lb.
Gross weight—8350 lb.
Top speed @ 9,000 ft.—275 m.p.h. plus
Cruising speed—240 m.p.h.
Range at cruising speed—4,000 miles
Rate of climb—1,500 ft. per min.
Service ceiling—26,000 ft.

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JAPANESE TISSUE

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AA In 32 Colors AA

Reference from Florida:

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4 sizes: 1½"; 2"; 2½"; 3"

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These lightweight motors have been designed to our specifications. Every detail of the original radial engine has been accurately reproduced even to the cowl plate at the front. They are a distinct improvement over any other dummy motor. At Whitfield's low price, they can be easily included in every flying model kit.

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Note New Address:

76 VARICK ST. NEW YORK CITY

Established 1869

Absolute ceiling—27,000 ft.
Gas capacity—600 gal.
Engine—Twin Row Wasp Jr. 700 hp.
Oil capacity—42 gal.
Color scheme:
Fuselage—green
Wing and tail—galatea orange

The Wedell-Williams Air Service has been purchased by Eastern Air Lines. The company, all of whose six officials have been killed in various crashes, is to be remembered by the many famous racing airplanes that it developed and its popular airline. One of Wedell-Williams last achievements was the development of a fast pursuit plane, design of which was sold to the government.

Congress may propose a bill for the construction of a large commercial dirigible in the near future.

In France, Poetz has produced a new twin-engined light bomber that has all the essence of speed. The crew sits in an enclosure atop the long, pointed fuselage. The landing gear retracts neatly into the low wing.

In Latvia, a small two-place low-wing sport plane has been built powered by an in-line engine. It has a cruising speed of 124 m.p.h.

The first of the Bristol Blenheim bombers has been completed in England. It is a low-wing twin-engined airplane of all-metal design.

World's Fastest Pursuit Plane

In the factory of the "Koolhoven Aeroplanes" at Rotterdam, Holland, which concern recently has been extensively enlarged, people are very busy on the construction of the F.K.55, a photograph of which is shown herewith, as this plane will ride the skies shortly.

This particular Koolhoven plane is entirely different in construction and form in comparison with the existing types of military planes of the Dutch designer and constructor, Frits Koolhoven. It resembles, as can be noticed from the picture, a flying torpedo. In the factory, the construction on fuselage, wings and propellers is almost finished. The powerful motor which will give the plane a tremendous speed, is also waiting to be installed.

It is hoped to have the machine ready for the aeroplane exhibition in Paris, which will be held in November.

It goes without saying that the construction of such an entirely new type takes much more time than it would under normal conditions and therefore the Koolhoven factories have called in the aid of the Labor Inspection Board, as it will be necessary to work on the construction of the plane outside the fixed hours, as set by the government.

The F.K. 55, in which diverse authorities are taking a keen interest, is a single-seater pursuit plane with a speed of more than 560 kilometers per hour. Besides this, the machine will be exceedingly maneuverable and have qualities to reach considerable altitude in a very short space of time.

In order to ensure all this Mr. Koolhoven has designed an entirely new type, most important features of which are that all heavy parts have been placed near the centre of gravity and that the machine will have two propellers, one directly behind the other, turning in a direction opposite to each other.

As may be seen from the picture, the pilot is seated in front of the wing, thus ensuring an unhampered view in all directions. In the middle section the wing has been made thicker and in this part contains the motor, exactly in the center of gravity.

In the wing, on both sides of the motor, the gas tanks have been constructed; two sets of machine-guns have also been placed in the wing. These four machine-guns are handled from the cockpit. The landing gear is fully retractable into the wing.

The motor shaft runs underneath the place where the pilot is seated and connects by means of a couple of gears with the two hollow propeller shafts, one turning inside the other in opposite directions. This ensures a smooth and equal flow of air around the plane, already having perfect streamline, resulting in a minimum of air resistance. Also the use of two propellers as described above, do not make it necessary to adjust rudder and/or elevator all the time, when flying in a straight line.

Furthermore another machine-gun has been placed in front of the pilot, which fires through the hollow propeller shaft (2), thus the pilot has at his disposal five machine-guns.

The motor, which will turn both propellers, is a Lorraine Petrel of 900 h.p. The plane is rather small for such a heavy motor, which however will increase its maneuverability and speed. The span of the plane is only 9 meters.

The landing gear of this flying torpedo is fitted with the well known "oleo" shock absorbers, system Koolhoven, and as mentioned already above, fully retractable.

How to Build a Scale Model of the Hawks Racer

Build the entire model of balsa wood which may be purchased at any popular department store or model shop. The model may be built at very little expense. Get dimensions from the accompanying plans for stock. If you wish to square off the plans, making them easier for measuring, join the corresponding dashes on border with sharp, straight pencil lines. Each square will equal one square foot in scale.

This model, known as "Time Flies," is very easy to build because of its very simple smooth flowing lines which a racer should have. Frank Hawks also has another new airplane, a Taylor Cub, which he calls "Time Flits."

Get all your tools together before beginning the construction. Those that are necessary are a razor blade, jig-saw, sandpaper (coarse and fine), paint brush, model cement, and if possible a small flat chisel.

Make the fuselage first. Draw the outline of the front view on stock, neglecting any of the tail surfaces, but including the engine cowling. Go around the outline with a jig-saw. Then draw on top view and cut again once more with jig-saw and chisel. With your razor blade, cut off the edges and make the fuselage oval-shaped as shown by cross-sections on plans. The cockpit may be hollowed out if desired and cellophane used as the retractable windshield. The reason the windshield has been made retractable on the big ship is because it les-

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DE LUXE MONOCOUPE—Kit No. SA-175. 32" wingspan. EXACT SCALE—1" = 1'0".

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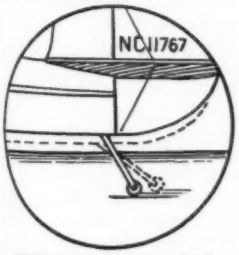
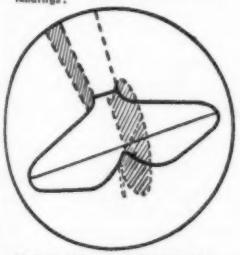
SHOCK-ABSORBING LANDING GEAR—smooth landings—prevents break-ups.

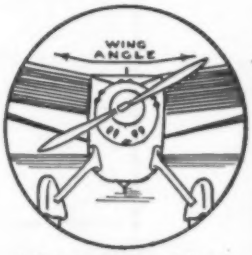


SHOCK-ABSORBING TAIL SKID—for perfect three-point landings!

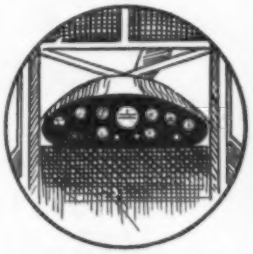


ONE-PIECE ELEVATOR—for positive, perfect alignment when glued to fuselage.

REMOVABLE WINGS—for easy, convenient transportation of model.



WING DIHEDRAL JIG—assures exact, correct wing angle for smooth, steady flights.



COMPLETE COCKPIT PANEL—fully detailed instrument panel for greater realism.

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And clear, easy-to-follow plans—how you'll appreciate them!

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36" FLYING CURTISS ARMYHAWK

36" FLYING FRENCH SPAD

36" "SKYABILITY" FLYING SCALE MODELS

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10" HAND CARVED PAULOWNIA WOOD PROP.

PLUS

● Expert design ● Realistic details
● Distance flights ● Sturdy construction

Colored tissue, turned wheels, 3 printed balsa sheets of ribs and formers, and large bottles of cement and dope. Complete, guaranteed kits for CURTISS HAWK, SPAD, or MONOCOUPE..... **$1.00** Postpaid

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KIT for SOLID SUPERMARINE or 15" FLYING SE5. Take Your Choice BOTH GIVEN WITH ORDERS OF $1.00 OR MORE

BALSA WOOD 18" STRIPS

1/16 sq. ..... 20 for .05
1/16x¼ ..... 16 for .05
3/32x3/32 ..... 10 for .05
¼ sq. ..... 10 for .05
¼x⅜ ..... 5 for .05
⅜ sq. ..... 3 for .05
½ sq. ..... 2 for .05
1 sq. ..... 1 for .06

18" SHEETS

1/32x2 ..... 6 for .10
1/16x2 ..... 6 for .13
3/32x2 ..... 5 for .10
¼x2 ..... 4 for .12
½x2 ..... 3 for .15

18" PLANKS

1x3 ..... 1 for .15
1x6 ..... 1 for .25
2x3 ..... 1 for .25
2x6 ..... 1 for .45
Double cost for 36" lengths.

BALSA PROPELLER BLOCKS

¼x⅜x15 ..... 7 for .05
¼x⅝x5 ..... 5 for .05
¼x⅝x16 ..... 4 for .05
⅝x1x7 ..... 3 for .06
¼x1x8 ..... 2 for .06
¼x1½x10 ..... 2 for .08
¼x1¼x12 ..... 1 for .06
1x1½x12 ..... 1 for .08
1x1½x15 ..... 1 for .09

SPECIAL BALSA COWLING AND NOSE BLOCKS

1"x2"x3" ..... .03
2"x2"x3" ..... .04
1"x3"x3" ..... .05

COLORLESS CEMENT

½ oz. Tube ..... .05
1 oz. Bottle ..... .10
3 oz. Can ..... .25

CLEAR DOPE OR THINNER

½ oz. ..... .05
1 oz. Bottle ..... .10
3 oz. Can ..... .15

COLORED DOPE (ALL COLORS)

½ oz. Bottle ..... .05
1 oz. Bottle ..... .10
3 oz. Can ..... .25

JAP TISSUE (20"x24")

White, 2 sheets .. .05
Silver, per sheet .. .05
Colored, per sheet .. .05

RUBBER

.045 sq. ..... 20 ft. .05
1/16 sq. ..... 20 ft. .06
⅛ flat ..... 17 ft. .06
3/16 flat ..... 12 ft. .07

PAULOWNIA WOOD PROPELLERS, HAND CARVED

5" ..... .10
6" ..... .12
8" ..... .16
10" ..... .20
12" ..... .25

BALSA CARVED PROPELLERS

5" ..... .05
6" ..... .06
7" ..... .07
8" ..... .09
10" ..... .11
12" ..... .13

HARDWOOD OR BALSA WHEELS

½" ..... pr. .03
⅝" ..... pr. .05
¾" ..... pr. .06
1" ..... pr. .08
1¼" ..... pr. .12
2" ..... pr. .15

CELLULOID WHEELS

½" ..... pr. .06
⅝" ..... pr. .08
¾" ..... pr. .11
1¼" ..... pr. .17

BUSHINGS

Small ..... doz. .03
Medium ..... doz. .04
Large ..... doz. .05

BAMBOO

1/16"sq.x12" doz. .03
1/16x¼x15" doz. .07

REED

1/32 O.D. ..... 5 ft. .02
1/16 O.D. ..... 5 ft. .02
⅛ O.D. ..... 5 ft. .03

WOOD VENEER

20"x30" ..... 1 for .20
20"x15" ..... 1 for .12

ALUMINUM TUBING

1/16"O.D. ..per ft. .07
3/32"O.D. ..per ft. .07
¼" O.D. ..per ft. .09
5/16"O.D. per ft. .11

12" WIDE SHEET ALUMINUM

.003 ..... per ft. .12
.005 ..... per ft. .16
.010 ..... per ft. .19

N.A.C.A. ALUMINUM COWLING

1⅛" ..... .19
2" ..... .21
2⅛" ..... .27
3" ..... .30

MACHINE GUNS

1¼" ..... 2 for .05
*1¼" ..... 1 for .06
1¾" ..... 1 for .07
*Bombs at the same price.

ALUMINUM DRAG RINGS

1⅝" ..... 1 for .19
2" ..... 1 for .21
3" ..... 1 for .29

DUMMY RADIAL ENGINES

1¼" Dia. ..... 1 for .15
2" Dia. ..... 1 for .25
3" Dia. ..... 1 for .30

Celluloid Dummy Motor & Drag Ring Combinations

1½" Dia. ..... 1 for .25
2" Dia. ..... 1 for .40

Sheet Celluloid 2"x6" ..... .02

Model Pins, large pkg. .05

Sandpaper, large pkg. .05

Thrust Bearings S. or L. .02

Washers, S. or L. 1 doz. .03

Dope Brushes .02

Instrument Paper Sheet, 12 sizes ..... .04

Nose Plugs .. .02

Wire (all sizes) 5 ft. ..... .02

Tru-Cut Balsa Knife ..... .10

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sens wind resistance to a great extent in its retractable position which adds greatly to the speed of the plane.

After the fuselage has been rounded out, go over the newly cut surfaces with coarse and then fine sandpaper until smoothness is obtained.

Make the wing next. It will be made in two sections, one for each side of the fuselage. Draw the outline of the top views of both sections as you did the fuselage. Be sure the grain of the wood is running lengthwise. Then cut with saw. Taper down the wing as shown in front elevation on plans with chisel, and then proceed simultaneously to shape out the airfoil section into the wing. When finished go over the surfaces with coarse and then fine sandpaper.

The tail surfaces are very simple to make. Cut them from pieces of sheet balsa with your razor blade and sandpaper thoroughly. They will then be ready for painting.

The propeller hub may be cut from scrap wood with your razor blade and the three thin blades cemented to it.

The landing gear struts are to be made of wood while the part that bends around the wheel to the axle is most easily made from a thick grade of copper wire flattened as required with a hammer. A small hole may be drilled at the ends just large enough to insert the wire axle with a drill or by hammering a pin through the metal. The wire may be joined to the wood strut by means of model cement and thread.

Shape out a tail wheel from scrap wood and begin the assembly.

Block the fuselage up in flying position on a flat surface. Using a large amount of model cement, connect the wing sections to the fuselage. Put blocks underneath to hold them in place. When connections have dried thoroughly, raise the model higher on the blocks and build up the landing gear, applying plenty of cement. Join the tail wheel in place and then cement the tail to the fuselage. The prop may be connected to the nose with cement or by a straight pin as a shaft so the prop may spin around.

Go over the entire model with fine sandpaper after all joints have dried thoroughly until a smooth surface is obtained. Brush off all dust and then begin the paint job.

The entire model should be painted cream with black trimmings. Many coats will have to be applied before a smooth finish is obtained. Do not apply a second coat until the first has dried sufficiently. It is best to sandpaper the model once more after the first coat has dried for the quickest results. After the paint job is completed the model will then be finished.

A World Record Hydro

(Continued from page 7)

Empennage:

1 tail boom 1/32 x 1/16 tapered to 1/32 square in 4½.

Stabilizer:

2 spars 1/32 x 1/32 x 8.
1 center rib 1/64 x 1/64 x 1 13/16.
2 tip ribs 1/64 x 1/64 x 1½.

Rudder:

1 spar 1/32 x 1/32 x 7.
1 bottom rib 1/64 x 1/64 x 1 11/16.
1 tip rib 1/64 x 1/64 x 1 7/16.

Landing gear:

3 floats exactly alike.

Material for one float.

2 top members 1/32 x 1/32 x 1.
2 bottom members 1/32 x 1/32 x 1.
2 uprights 1/32 x 1/32 x 3/16.
4 spreaders 1/32 x 1/32 x¼.
1 piece superfine Japanese tissue ⅜ x 4½.

Struts:

1 rear strut 1/32 x 1/32 x 2 5/16.
2 front struts 1/32 x 1/16 tapered to 1/32 square in 4 11/16.
1 sleeve 1/64 x 9/16 x 5/32.

Power plant:

1 propellor 5/8 x 1 x 8.
1 propellor shaft .014 music wire.
2 washers bronze.
1 motor 1/32 x 1/32 x 21 brown rubber.
1 "S" hook .014 music wire.

Microfilm solution. Cement. Banana oil. Rubber lubricant. Water.

The weight of the ship without rubber motor is .023 ounce.

The efficient sleeve connection for the landing gear was developed by Walter Lees, Charles Heinz and William Wert about two years ago.

The class "B" ship is similar to the class "A" ship.

Wing span 29 ¾.
Wing chord 4.
Elevator span 10.
Elevator chord 3½.
Rudder height 3⅞.
Length of motor stick 15.
Propellor 12.

With these important general specifications, the class "B" hydro-airplane can be duplicated.

Both models are now a part of the P.M.A.A. exhibit in the Hall of Aviation at the Franklin Institute in Philadelphia.

Building a Streamline Gas Model

(Continued from page 11)

sure that the ribs are square with the trailing edge. Hold in place with pins. Before cementing, however, line up each center line on the ribs with the leading edge center line. Cut a V-shaped piece of balsa to fit in the space between the leading edges at the center. Cement this in place.

While this structure appears to be fragile and ungraceful, planking will change both the appearance and the strength. Get about seventy planks of the regular size, 36" long. At this time it would be well to equip yourself with about a half-dozen 2 oz. collapsible tubes, obtainable in any drug supply house. Instead of leaving the threaded head as it is, it will be found convenient to shape it as shown in the detail, "CEMENTING." Squeeze part of the head flat with pliers, so that about half of the original hole is left. Clip off about 1/32" of the resultant flange from squeezing, leaving a shoulder, which acts as guide in gluing a plank. It is also shown in gluing position in the detail, demonstrating how a long plank will be conveniently cemented in a few seconds. Cementing will be found almost impossible if this arrangement is not used.

Naturally, the edge of the first plank laid should have no cement on its edge, since it fits against no other plank. This first plank should be laid directly over the

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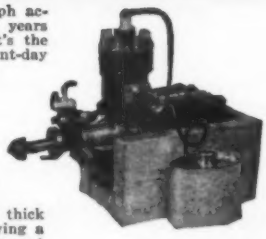

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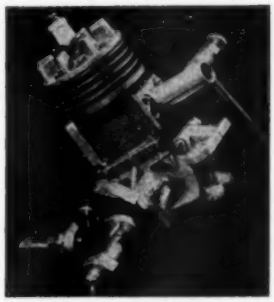

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trailing edge of the stabilizer or fin, overlapping it somewhat as shown on the rib drawing. Apply cement to the ribs and the spar where the plank will rest and cement the latter in place.

Now proceed with the rest of the 36" planks, first applying cement to the edge with the tube, then applying cement to each of the ribs. Be absolutely certain that all cement joints are perfect. When no more 36" planks can be laid on the structure, put two planks immediately behind the leading edge. They should be joined with the corresponding planks on the other side of the stabilizer with a butt joint immediately over the center rib. Continue now with the planking, laying them on straight across as before, joining their ends with the two leading edge planks by cutting to the proper angle. Keep a constant vigil for imperfect cement joints and any slight distortion of the surfaces. The fin may be made with the stabilizer. Trim off the ends of the planks on the stabilizer and fin to the end ribs.

From hard balsa, cut blocks of proper size to shape as shown in the small illustration "TIPS." Cement these blocks on the stabilizer and fin end ribs. When dry, shape both the leading edge and tips of the stabilizer and fin, using a knife and a rough sandpaper block. Make all your curves smooth and even. Use templates wherever you can.

For rough sanding and shaping, make a sanding block from some hard wood; 9" x 1½" would be an excellent face size for this block. Use No. 1½ sandpaper for roughing tips, leading edge and plank. Go easy on the planking, using the rough only for levelling. It would also be a good idea to allow the planking to stand a very long time before attempting sanding. You could leave the sanding go while other parts are being constructed and come back to it later. To continue, use the rough sandpaper until the entire surface has been trued up. Do not sand too much in one place; never allow the planking to be less than 1/16". The average thickness of the skin should be 3/32". Without the block, run over the surface with successively finer coats of sandpaper, finishing with triple-0. Now bevel the planks over the trail-edge of the stabilizer and fin as shown in the rib drawing. This gives a much smoother fit between the control surfaces and the fin and stabilizer.

Now construct the elevator and rudder. Note that these were not covered with planks, but with soft ⅛" sheet. Planks may be substituted if more convenient. Follow the same procedure, omitting the trailing edge, since the planking takes its place. Note that the leading edge is not the full 18" and 10" of the stabilizer and fin. Therefore, the largest rib in the elevator and the end rib on the rudder do not exist, but are shown in the drawing to give the size at that point. The end of the elevators and rudder will have to be cut to a curve to fit the fuselage tail plug, but you will have to lay them aside now until the tail is built into the fuselage. Thus, the end of the elevators and rudder are left square with no rib until they can be cut to an accurate fit.

Wing

Here the first job is to cut out all the ribs from the templates. Follow a similar system in doing this as was used in the tail surface construction. Bristol Board is also used for templates. Be sure to mark off the center line on *ALL* ribs, and, very accurately, the points where the spar slots come. The same stock, 1/16" hard balsa, is used. Cut two ribs from each template except No. 2. Make twelve from this template. It would be a good idea to cut out the front spar slot on all the ribs, making the cut 1/16" wide. Line all the ribs up together with one piece of wood in the front slot, and mark off the placement of the rear slot. This insures accurate construction.

From the same 1/16" balsa, cut out the light wing spars. They serve only to line the wing up, but do give some box-spar effect to the wing structure. In cutting the spars, study carefully the method with which the ribs are hooked on. The spars are 2" wide and a little over 54" long, the excess for bevelling at the center. On all the four pieces, draw a center line approximately ½" from one side. This line *MUST* be straight, regardless of any curvature of the wood. Pin these spars to a table, in pairs, adjusting the dihedral of 6½" on each side very accurately. Bevel off the ends of the spars where they meet in the center so that the fit will be good. The center lines should coincide at the center. Remember, if the front spar has ⅛" more dihedral than the rear, it will give about 5/16" wing warp. Therefore, you must get the dihedral on both spars very accurate. Cut a piece of balsa, 1/16" x 2" x 2" and cement it over the joint at the center of the spar, getting it accurately centered. Four such gussets are used, one on each side of the joint on each spar.

There is no center rib in the wing structure. Its place is taken by two ribs, 1" from the center, resting against the gussets over the spar butt. They are made from wing template No. 1. Notice that rib No. 1 is not the regular N.A.C.A. 2R12 wing section used throughout. Its bottom has been flattened so that it will rest easily in the wing mount, and give the wing the proper dihedral angle. Rib No. 2, of which twelve are required, is next. As can be seen, all the rest of the ribs all the way out to the tips are spaced three inches apart, but the interval between the first of the No. 2 ribs and rib No. 1 is but two inches.

With all the rib spacing marked accurately on the spars, the notches may be cut down to the center line. Be sure that the notches are cut so that the ribs will fit in rather loosely. If this is not done, the wing will sag in a gull-like effect.

The structure is now assembled. As can be seen from the drawing on the three view page, the joints are all cross-lap. Fit the ribs in their places, but refrain from applying cement until they are lined up. The center line on each rib *MUST* coincide with the center line of the spar. Look down the wing and ascertain that the ribs are well lined up. Correct any minor discrepancy. Now apply cement, keeping ribs and spars squared up.

Do not attempt to shape the spars to fit the curving taper of the wing. They should be left as they are until the wing has been planked. Rib No. 14 will not fit into the rear spar. It should be cemented to the

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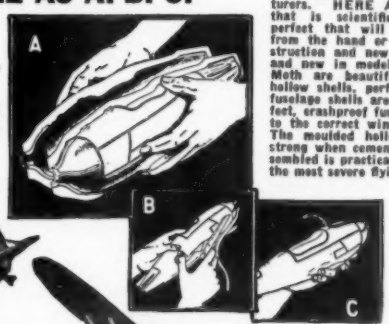

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front spar and lined up with the other center lines with the eye. The rear spar will be cut off later.

All planks are ⅛" x ⅜" x 36" long, the regular size. About 175 planks will be sufficient to cover the entire wing with some to spare. The first plank is laid along the front of the rear spar atop the wing. It is centered accurately, 18" sticking out from the center on each side. Before placing it, cut off the ends so that the plank will run exactly from the sixth rib out on the left to the similar rib on the right, terminating at the center of each rib. This will give a resting place on these ribs for the next plank on each side. Merely pin the plank to each of the ribs, and it will assume a smooth curve, the proper one, about the center section. The next plank after this one should be shifted up two ribs either to the right or the left. When this is in place, complete the planking out to each end of the wing, using the extra end from one side to fill in the space on the other tip. Thus, in most cases, four planks, instead of three, are required to run from tip to tip. The third plank should be two ribs away from the first plank in the opposite direction from the second plank. The first three planks in place, you are ready to begin this process over again, although it is not necessary to follow this order. Merely follow these rules: never allow two butt joints to occur on the same rib within one plank of each other. In other words, keep all joints separated on the same rib by at least two planks. The second rule is never to allow joints to occur less than two ribs apart, and the third rule is to have no joints less than 12" from the center of the wing.

Complete the planking of the top of the wing, ascertaining that there is no warping before continuing. If there is the slightest warp, place diagonals between rib and spar at strategic sections. These will give a slight twisting effect, depending upon where they are placed, which should correct any warp. These pieces should be merely forced into place and removed when nearly all the lower planking is on. Their length, of course, must be very carefully adjusted.

Turn the wing over, and with some sort of support for the center section, plank the section between the spars as before. It will be noticed in both cases that the planks toward the rear spar do not touch rib No. 14 at the tip, so that they are last attached to rib No. 13. Complete the planking as though the rib were there however, and the excess will be trimmed off for the trailing edge later on. In the meantime, hold these planks together at the tip with pins.

With the planking thus far completed, the leading and trailing edges may be attached. Because of the curved taper, it was found advisable to laminate them. The first leading edge piece is ¼" x 1" soft balsa, a bit over 54" long. Two such pieces are

required, joined at the center with a butt joint. In cementing them to the ribs, leave enough over on top and bottom for the planks to rest against. The joint for the leading edge pieces should be similar to that used in the spar with the exception of the gusset. The next two pieces are ¼" x ⅞", but extend only to rib No. 13. Cement this to the surface of the first piece and join at the center as before. The following two pieces are ⅛" x ½" and extend out to rib No. 10. Cement to the surface of the second piece about 1/16" below its center.

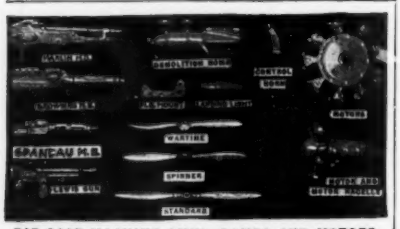
The first trailing edge piece is ¼" square and runs all the way to rib No. 14. The second piece is ¼" x 3/16", goes to rib No. 13, and is cemented to the surface of the first lamination exactly on its center. The third piece, also cemented exactly on the center of the second piece, is ⅛" square, and runs out to rib No. 10. Do not trim until planking is complete.

Using the same sequence system as used before, plank the rest of the wing, remembering to run one plank along the leading and trailing edge. As on the tail, the other planks are attached to this plank rather than to the edges themselves. These edges should curve nicely, if they are soft balsa, to fit the trailing edge. When it is found necessary to join a plank to one of these edge planks, do not shape the end of the plank as in the tail, but insert the plank, with the equare end, as far as it will go between the two planks. When no more full planks can be put in, a number of triangular spaces will be scattered over the surface of the wing. Fill these in with odd scraps of planks. A wise choice of the proper plank stubs to cut will result in very little waste.

Planking done, the wing spars may be trimmed down to the surface of the planking, and the leading and trailing edges may be shaped roughly with a knife. Shape the taper of the leading and trailing edges according to the stations at ribs 14, 13, 10 and 2. Do not attempt too thin a trailing edge, but get it as thin as you can with accuracy.

Cut out 2 blocks of sufficient dimensions for the wing tip and cement them to rib No. 14. After the cement has dried, shape according to plan and profile templates and give it a smooth curve with sandpaper.

Sand the entire wing after a sufficient time has been allowed for the planking to dry. As before, the job will be improved by waiting. When using the block for levelling, use a stroke running about 45° to the edge of the wing. Be especially sure to include the slight hollow atop the wing near the trailing edge. Sliding over this and making it convex instead of concave will affect stability.



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4"	ST.....20c	6"	SP.....50c	3"	ST.....20c
5"	ST.....25c	2"	W.....10c	4"	ST.....30c
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Germany Spans the Atlantic

(Continued from page 5)

this; she has not speed nor reserve power enough, and must buck right through, but the Hindenburg has such reserves of speed and her schedule is so liberal that she doesn't have to worry. Unlike the steamers, she has no regular track but takes whichever one the prevailing winds have made the shortest. As a matter of fact, her routes during the last summer varied all the way from the extreme north to the extreme south. On one trip she went out across the upper end of Labrador and sighted the tip of Greenland; on another she flew right over the Azores and came up the coast from Miami. The German pilots have not only become extremely skillful at avoiding storms in this way, but have actually learned to turn them to advantage. A North Atlantic storm usually whirls around a center in a circle hundreds of miles across. When such a disturbance is reported, the Hindenburg does not try to avoid it altogether, but turns into whichever edge of it is going her way and sails along with a booming tail wind. In this way, the record Atlantic passage of two days from Lakehurst to Frankfurt was accomplished last summer.

It is this ability to use the winds that gives the dirigible its big advantage over the airplane for trans-Atlantic flights; the airplane, having less lifting ability, cannot carry such huge reserves of fuel; like an ocean liner it must buck straight through a gale or else sit down and wait for the wind to subside.

This is why the Germans think that the dirigible is the only answer to the question about trans-Atlantic passenger lines. "Of course," said Captain Jahns, the representative of the Deutsche Lufthansa who came to New York to supervise the flights of the Aeolus and Zephir, "Of course you want to remember that we do not have in Europe any long distance flying boats such as you have in America. They are not needed for European conditions. The longest oversea hop in Europe is that between Brindisi and Cairo on the Imperial Airways, and that is made in land planes. There has been no development of big oversea flying boats."

In other words the Germans haven't anything like the Navy Consolidated boats, the Sikorsky or Martin clippers, nor do they expect to develop them. The flights made during September and October, were in DO-18s, both Aeolus and Zephir being of this class—a high-wing monoplane boat of streamline design, with two 600 horsepower Junkers Juno Diesels, a wing spread of 78 feet, a top speed of 155 miles an hour and an ordinary cruising speed of 124, with the diesels throttled down as they usually are. These ships were taken off the regular South Atlantic run for the test flights to the United States and back. The Germans have been operating these regular South America flights for several years now; mail and express is picked up in Central Europe in land planes, flown to Dakar in them and then transferred to the flying boats for the trip across to Pernambuco in Brazil. The Lufthansa's Brazilian base is at Rio; Pernambuco is only a stop with an emergency repair station and Dakar has nothing but a floating base.

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These floating bases, incidentally, are the characteristic feature of German overseas airplane operation, and a consideration of them furnishes a picture of what their North Atlantic service will be like when they get it in operation. Originally there was only one—an old freighter, the Schwabenland, which was used as a supply ship and seagoing trouble-shooter for the Lufthansa South Atlantic line when it first started. By and by the Germans fitted her with the landing-mat which she trails behind her, where a seaplane can land and crawl up to her deck like a seal on a beach. Then, as the South American line began to develop into a paying proposition, they ran into the difficulty which has hampered every company operating long distance seaplanes —that of getting them into the air with full payload, especially in rough weather. It occurred to somebody that the Schwabenland had a lot of space and engine power going to waste as she stood, so they tried converting her into a special catapult ship which would shoot the big flying boats into the air no matter how bumpy the water.

The Germans experimented for about two years before they hit the right combination, but they finally made it, and it has worked out so well that another old freighter, the Westfalen, was taken over and converted into a similar catapult and base ship. Both of them have now been in service on the South America run for some time; in anticipation of the North Atlantic service being installed next year, a third ship is being converted and two new ships specially constructed from the keel up.

All of them are a good deal alike. Their cargo space is devoted to huge storage tanks for the heavy oil the diesel air engines use as fuel, food supplies, spare parts and machine shops. They can make any repair an airplane needs at sea. Last year, for instance one of the South Atlantic boats came down ten miles out with a badly conked motor. The Westfalen rushed to the spot, picked her up, made repairs and shot her into the air again, all in under an hour.

On deck the whole after-surface of these ships has been cut away to leave room for the enormous catapult, more than 40 feet long. This catapult is operated, not as in the navy, by gunpowder, but by compressed air. When one of the big planes (which weigh ten tons with everything in) is ready, the ship's engines start working up compression in a giant metal bottle. A pressure of 90 to 100 atmospheres is reached before the tripper is pulled. The air drives a piston, which in turn pulls a long steel cable, which actuates the car that throws the plane into the air. With these catapults and the repair shops, the base ships will do about anything that has been claimed for various types of "artificial islands" like the Armstrong seadrome. The Germans point out that the cost of such structures would be tremendous; that the catapult ships can, in addition, move around and go to an airplane in trouble, or hurry to meet one, and that their location can be changed at will.

The new German catapult ships will have more powerful throwing arrangements than either the Schwabenland or Westfalen, capable of handling bigger planes. As a matter of fact one of the first things dis-

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covered by the Lufthansa during the North Atlantic test flights was that the DO-18s they had been running to Brazil would not do for northern conditions.

This, however, was something they had pretty much suspected all along. The South Atlantic flights are made through the region known to sailors as "the doldrums", where the weather is nearly always fine, the hop short and headwinds non-existent. In making their survey of the North Atlantic, the Lufthansa figured very reasonably that if these fair-weather ships could do it, the bigger, faster and better ships now building for the spring, would have very little trouble.

These new planes are being constructed by a firm entering the aviation field for the first time—the famous Blohm & Voss shipbuilding firm. Not many details have been released on them, but they are reported as float seaplanes; high-wing monoplanes with four diesel motors set in the wings two and two, with paired floats below, something like a water-going Fokker transport in appearance. Four 600-horsepower motors means they will be big ships all right.

Incidentally, they will have diesel motors, like all the other German trans-Atlantic craft. The Germans feel that it is the only motor for commercial work over long distances. It does not give such high speeds as the gasoline motor, but enormous speeds are not necessary and the diesel is greatly superior in economy (on the Brazil run two flying boats were tried out, one with diesel and one with gas motors, and the diesel ship operated 70 per cent cheaper) and definitely superior in eliminating the danger from fire, the bugaboo of over-ocean flying.

Even with its huge ships, the Luthansa has no intention of entering the trans-Atlantic passenger field with airplanes. "In Germany," said Captain Jahns, when he was in New York, "we believe that the dirigible is superior for passenger work. No matter how large you make the airplane, it cannot offer the roominess and comfort of an ocean liner. To compete with surface ships, an air liner must not only beat them in speed; it must also offer more comfort. The Hindenburg can do this; it has plenty of room and the passengers are never seasick. The airplane cannot do it." Therefore the new Blohm & Voss trans-Atlantic seaplanes will carry nothing but mail and fast express, at which game they can beat the Zeppelins by greater speed, making the complete passage in about twenty-four hours.

As to what routes these seaplane lines will follow and what the details of their operation will be, nobody knows or will know until the test flights are complete. The flights in October were only the beginning. The Lufthansa counts upon at least twelve experimental trips before setting the line into operation; six with the South Atlantic flying boats and six with the new Blohm & Voss ships. These flights will give the aviators experience with North Atlantic weather and flying conditions, and will determine whether the route through the Azores and Bermuda, or that through Newfoundland and Ireland, will be used.

The only thing certain is that about next August there will be ads in the papers offering to carry packages to Germany within twenty-four hours, and passengers within two days.

"Gas Lines"

(Continued from page 9)

ground north of the airport and caused it to nose over. The damage was slight. The wing flaps proved their worth as they cut the landing speed about fifty per cent."

This is the first time that we have ever heard of flaps being applied to a gas model and Dykzeul receives our greatest commendation for this feature. It appears that he is one of the foremost thinkers in this gas model field.

The completed model has a wing span of 48 inches and weighs three pounds. Spruce is used for all highly stressed parts. Balsa is used for the stringers, formers, ribs and a few spars. The wings are mounted so that they come off in the case of a bad landing or crack-up. The flaps are entirely automatic, requiring ten seconds to be completely lowered by a camera timer.

Gas model activities have spread to Salt Lake City, Utah. The first gas model contest was held here recently by the Model Aeronautical Research Club with headquarters at 130 D Street. There are nine members in the club, with Harry Mori as president and Bill Nelden as vice-president.

The contest was very successful. It was the "Gotch" type, in which the winner is determined by the number of points won. Points are awarded in the following order:

Workmanship, including engineering and originality, 30; take-off, based on flight attitude and distance to get off, 20; altitude attained with restricted engine time (maximum being forty-five seconds), 20; glide, 20; landing, 20; attitude (that is, ability of plane to take-off and fly), during entire flight, 30.

This manner of running off a contest should make it extremely interesting and valuable to those who are interested seriously in designing airplanes. It makes a science of gas model flying rather than merely a sport.

We are indebted to J. R. Edwards and Bill Nelden for pictures No. 4 and No. 5, taken during the contest.

Picture No. 4 shows Harry Mori's winning model in flight over the Salt Lake Municipal Airport. Picture No. 5 shows the group of contestants with a good sized crowd which attended the contest. Mori's model may be seen in the line second from the left-hand side. It is evident to those who have had experience in gas model flying that this activity is causing more interest among the general public than rubber contests can ever hope to create. It seems that older people are taking to building gas models seriously, whereas formerly model building was considered child's play by the average person. In fact, it appears that gas models are "putting it over" with the public.

Harry Mori won first place with a total of 140 points. His ship was a redesigned Goehring. Edwards says in his letter:

"To give you some idea of the exactness with which he builds; his wing was completed and he had it balancing on a pin point at the center. His elevator was off 1/64". His landing gear, which is like the KG, has steel fittings to allow the wheels to slide back without binding. The landing gear can be taken off the fuselage in a few minutes and put back just as quickly."

Second place was won by Jay Curtis, who flew a Buccaneer, with a total of 135 points. The judging was done by Ray Peck who is manager of Thompson Flying

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Service and Carl Helberg, head mechanic, of this firm. Other entries were:

Bob Snow, Ronald Conrad, Kent Wilton, Willard Card, Wesley Keller, Earl Player, Jay Edwards and Keith Potts, age 13, who flew a Miss America powered with a ¼ hp. engine built by his father.

Herbert Greenberg of 305 Keer Avenue, Newark, New Jersey, who has made himself famous building indoor models, has gone to the other extreme and has now been designing and building gas models for some time. He is shown with one of his latest creations, the "Red Zephyr," in picture No. 6.

It appears that originality is not dead yet, for T. H. Satterthwaite of 110 Harwicke Road, Springfield, Pa., has raised himself to a high place in gas model history by building a gas job completely of aluminum tubing. The frame of his ship in which the motor is mounted is shown in picture No. 7. He says:

"The whole structure is put together with aluminum solder and is strong enough to hold my weight. Incidentally, I weigh 175 pounds. I believe it is strong enough to take almost any crash and come out none the worse for it. In the near future I plan building a wing for it, also made out of dural tubing.

"The plane has a span of eight feet and is powered with a Hurleman 1/5 hp. engine. The whole plane, complete, weighs 6½ pounds.

"There is considerable gas model activity in my town. Though it has a population of only about 2000 people, there are four gas jobs now under construction and nearing completion within seven blocks of my home."

It appears that the new slogan soon will be, "A gas job in every home."

Not much has been heard from Irwin G. Ohlsson of 630 North Alvarado Street, Los Angeles, Calif., lately, though he is one of the pioneer gas model builders. However, he has come out of his shell and we find he has been working on a new motor. Picture No. 8 shows it mounted in one of his planes. Last July this ship and motor was entered in a contest and placed among the winners. One of the features of the motor is the removable crankcase, which allows the replacement of the main bearing. Recently one of these motors, on a block test, ran at high speed for fifty hours continuously and very little wear resulted after the test was completed.

Now we jump to Brussels. We hear from Mr. J. L. Gravenstein of 32-34 Rue Pierre Decoster, Bruxelles, Midi, Belgium, who tells us that he has built a KG with slight improvements, which is shown in picture No. 9. He has already flown it six times and the longest time was sixteen minutes' duration. It reached an altitude of about 1300 feet. Mr. Gravenstein says:

"On every flight the landing was perfect and nothing was broken or damaged."

Kenneth Willard, who is now connected with the American Airlines, Inc., Lunken Airport, Cincinnati, Ohio, and is one of our expert rubber power model builders, attended a gas model contest a short time ago and while there was bitten by the gas bug.

This "germ" has succeeded so far in eluding all attempts to isolate and kill it. The disease seems to be spreading rapidly but as yet has caused no fatalities. In Willard's case it was a source of great excitement, pleasure and wonder, for he recently completed a beautifully designed job and powered it with an Elf engine. The ship is shown in picture No. 10. (Gas model designers please note the high line of thrust and low center of lateral area). Willard writes that his first flight was most unexpected and exciting. He says:

"I planned to run some taxi tests first, so I enriched the mixture and had the engine four-cycling nicely, running around on the apron in front of the hangar at the airport, when all of a sudden and much to my surprise, the tail lifted and the ship was off the ground. I tried to catch it but I'm not that fast, since I can only run about 18 or 19 miles an hour.

"Incidentally right here I want to tell you that the idea of taxi tests with half power, or four-cycling power, was a failure because that was enough to pull it off the ground, and once off, it was too late.

"On the take-off it headed for the hangar, missed it by about a foot and then headed for another, again missing by the narrowest of margins. Then full power cut in for a short while and she zoomed to about fifty feet. Unfortunately the gas tank was half full and it soon started to climb and reach an altitude of about 2000 feet. While climbing it turned slowly and headed over the Ohio River."

Fortunately, Willard was able to induce a friend to follow it in his airplane. In spite of this the model was lost to view and they finally gave up the search for the ship and returned to the field. Just as they were approaching it Willard looked up and there, to his surprise, was the model above him! After that they followed the model until it landed in a tree near Fort Thomas, Kentucky. The flight lasted for twenty-eight minutes and reached an altitude of 1200 feet, even though there were no thermals.

The little ship has a wing span of 64 inches and weighs one pound, four ounces, ready to fly. The wing section is a modified Clark Y with a tapered wing.

Next we have some news from an unexpected part of the world. It is from Mr. U. A. Raaff of 36 Tjidengweg Oost, Batavia-Centrum, Java, Netherland East Indies. He has been kind enough to send us picture No. 11, which shows the first gas model that has pierced the air of tropical Java. This picture was taken when the machine was in actual flight. This not only speaks well for its design but shows the model to be very beautifully constructed. The machine was designed by Mr. Raaff and built of "Airplanood," which is a new type of wood that grows in Java. Believe it or not, it is lighter than balsa. (Readers who would like to know more about this should write to the editor.)

Mr. Raaff says that on the first flight, his ship landed in a hedge, damaging the landing gear and propeller slightly. However an old Chinese carpenter of the navy carved another beautiful new prop for him, exactly like the old one, and he mounted it on the Baby Cyclone engine. Shortly after he tried the model again with the result shown in the picture. The flight lasted for seven minutes on six cc. of fuel and attained a height of about 325 feet. The second landing was not so good, inasmuch as it was a "tree point landing." However, in a short time Mr. Raaff will try the ship again.

The plane has a wing span of 6 feet, 5 inches and weighs, ready to fly, 4½ pounds.

Judson Marsden of 3924 Honeycutt Street, Pacific Beach, Calif., sends us picture No. 12, which shows one of the finest designed models we have seen. Marsden says that it is very stable and is an unusually fine flier, though the wing span is only six feet. He makes an unusual but interesting suggestion:

"I would be interested in seeing a gyroscope developed for gas jobs which will control the rudder and keep the ship on a predetermined course."

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There may be something to Mr. Marsden's suggestion. At any rate here is something for gas model fans to think over and try out.

Recently Anderson, Indiana, became gas model-minded through the efforts of Mr. Herbert M. Kennedy of "The Anderson Daily Bulletin," and staged the Anderson Model Airplane Contest, sponsored by the "Bulletin." An enormous crowd, conservatively estimated at 15,000, turned out. This was the first event of its kind which was held in this vicinity. Colonel H. Weir Cook, of Indianapolis, World War ace, served as chief judge.

Picture No. 13 shows Paul Laux measuring gas for Kenneth Frandsen's ship during the contest. From the picture it appears that a very unique device is used for measuring and injecting the fuel into the tank. There is a receptacle which holds the fuel and out of this extends a tube through which the fuel is drawn and by means of which it can be measured. It is then ejected from the tube into the tank. Mr. Kennedy says that other contests are planned inasmuch as their first was such a great success.

NOTICES

Mr. Edward R. Guth of Liverpool, New York, R.D. No. 1, one of our well-known gas model builders, is editing a little monthly sheet called "Edward's Model Shop News."

We have the pleasure of welcoming Charles Bossi, to the United States. Formerly he lived in France and was a member of the "Modile Air-Club de France." He expects to continue his gas model career here in the country. He now lives at the Mayfair House, Lincoln Drive, Germantown, Philadelphia, Pa. Gas model builders may find it a pleasure to write and contact Mr. Bossi.

Friday the 13th proved to be a "bugaboo" to Elmer A. Riemer, for he tested out his latest gas job early in the morning of that date. It flew from Curtiss-Wright Airport and after a few minutes disappeared from sight. Riemer travelled about eighty-five miles hunting for the ship but was unable to find it. It vanished in a northeastern direction from Curtiss-Wright Airport. If anyone finds this ship, will they kindly get in touch with Mr. Riemer at 1474-A West Locust Street, Milwaukee, Wisconsin, or with MODEL AIRPLANE NEWS, 551 Fifth Avenue, New York City. The model was a "Flying Quaker" powered with a Forster Brothers engine.

Here is some more bad news. A Brown Junior motor, belonging to Carroll Carter of 3839 26th Street N.E., Washington, D.C., was either stolen, lost or strayed to parts unknown during the Junior Birdmen gas model contest held on August 23rd, 1936. The motor number was B-776. If anyone knows of the location of this motor, will they kindly write directly to the International Gas Model Airplane Association, MODEL AIRPLANE NEWS, 551 Fifth Avenue, New York City.

UNIT NEWS

Western Pennsylvania

As usual Bob Allen of 7041 Frankstown Avenue, Pittsburgh, Pa., is in the first line when it comes to unit news. Bob, as you know is I.G.M.A.A. director of western Pennsylvania. He is now giving a radio program three times a week over Station WWSW. It is devoted exclusively to models and primarily to gas models and the I.G.M.A.A. Under this stimulus the western Pa. I.G.M.A.A. is becoming very wide-spread. It appears that they have changed the geography of that section of the country, for now western Pa. includes Columbus, Ohio, in I.G.M.A.A. jurisdiction at least, for a division of Unit No. 3 has been formed in Columbus. This group is headed by Robert B. More. Mr. More holds license number I.G.M.-3-2-1. He is extremely active in relieving others of their troubles with motors and ships.

Another important thing which comes to our attention is that Mrs. Bob Allen, one of the few women members of the I.G.M.A.A., has just obtained her private pilot license, having had fifty hours of flying.

Milwaukee, Wisconsin

Another gas model unit has been formed in Milwaukee, Wisconsin, under the name of the Hell Divers Gas Model Association. Edward J. Brounk is secretary and treasurer and all correspondence should be addressed to him at 1331 South 15th Place. At present there are eight members. They are: Harold Sinsky, president of the club; Berton Schmidt, vice-president and flight commander; Edward (Shorty) Brounk, secretary and treasurer; Phil Coerper, Paul Grossman, Walter Shoen, Dick Trester, and Charles Vogel.

So far the club has five gas jobs that are ready to fly when the weather will permit it. The purpose of the club is as follows: to get together all gas model builders in the city of Milwaukee and promote aviation to all young and old. Also to get more members to join the I.G.M.A.A. to build and to fly gas-powered models of kits or their own designs.

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The "BUCCANEER"

Complete Materials: Including complete plans, 4½" M.&M. Model Wheels, Pint cans of Cement and Colored Dope, and everything to complete the model (less motor) **$9.50**
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GAS MODEL SUPPLIES

Here are only a few of the many items we stock for gas models. See our catalog for the complete list.

Aircraft Spruce 5 ft. lengths

3/16 sq.	7c
3/16x1/2	10c
3/16x1	15c
¼ sq.	9c
¼x½	12c
¼x1	17c
Small Panels	
3/16x3x12"	8c
¼x3x12"	10c

Gas Model Balsa 5 ft. lengths

⅛x¼	2 for 5c
⅛x2	2 for 25c
3/16 sq.	8 for 25c
3/16x⅜	2 for 9c
3/16x2	2 for 30c
¼x¼	6 for 25c
¼x½	4 for 25c
¼x2	2 for 35c
⅜x⅜	3 for 25
½x½	2 for 20c
1x1	25c

Clear Dope
Pint 65c

Basswood 5 ft. lengths

⅛x¼	6 for 25c
⅛x1¼	20c
3/16 sq.	5 for 25c
3/16x½	3 for 25c
¼x¼	4 for 25c
¼x½	10c
⅜x⅜	10c
½x½	15c

Gas Model Cement
Pint 65c
Quart $1.10

Colored Dope (All colors)
Pint 70c

Bamboo Paper 24"x36" sheet
Per sheet 5c

Dural Angle
½x½ per ft. 15c
¾x¾ per ft. 22c

Turnbuckles
¾" take up
Each 20c

Steel Music Wire 5 ft. lengths

3/32" dia.	15c
1/16" dia.	25c

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1/32x3x12"	15c
1/16x3x12"	28c

Ordering Instructions

Minimum order for 5 ft. lengths is 50c.

Add 15c packing charge on orders for less than $1.50 in U.S.A.

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Hand Carved. Made in America. Accurate, Balanced, and Completely Finished

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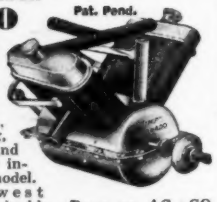

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Model V-4 (shown above) four cylinder. Weight only 3½ oz. Will fly models from 4 to 8 feet. Complete with Generator. Feed Line and Safety Clip..... **$7.50**

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The New Cherry Wood Props specially designed for Gas Models.

12 in., 13 in., 13½ in., 14 in. } 75c each | 14½ in., 15 in., 16 in. } $1.00

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The genuine Paulownia Wood Propellers, "As light as Balsa with Twice the Strength."

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5 in.	each 7c	5c	10c
6 in.	each 10c	7c	12c
7 in.	each 12c	10c	15c
8 in.	each 15c	12c	20c
9 in.	each 18c	15c	25c
10 in.	each 20c	20c	30c
11 in.	each 25c	25c	35c
12 in.	each 30c	30c	40c
13 in.	each 40c	35c	50c
14 in.	each 50c	40c	60c
15 in.	each 60c	50c	70c
16 in.	each 70c		85c
18 in.	each 80c		95c
20 in.	each 1.10		1.30

(Orders less than 50c, add 5c Postage)

Send 5 cents Get our New Propeller and Motor Efficiency Charts showing relative efficiency of Leading Gas Motors and best Propeller Types and Sizes for all Models. Prepared from actual tests by recognized Aeronautical Engineer. Charts sent with Catalogue of all "IMP" Products for only 5c.

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Detroit, Michigan

We hear from James B. Kiss, Jr. of 9089 Lyon Avenue, Detroit, Michigan. Mr. Kiss is the acting president of the Delray Organized Gas Model Society. This club is in the throes of being organized and they wish any fellows who live in the neighborhood of Detroit and wish to join the club to get in touch with Mr. Kiss at the above address.

CONTESTS

Glenview, Illinois

Lately there have been a great many gas models contests. One of the important ones was held recently at the Curtiss-Reynolds Airport in Glenview, Illinois. It was sponsored by the Gas Model Aeronut Club of 2411 West 55th Street, Gage Park, Illinois. It was held on the 11th of October, 1936, and was attended by about 1500 people. There were forty gas models in the competition. Five contestants were from Toledo, Ohio; five from Indianapolis, Indiana; six from Joliet, Illinois; and the rest from Chicago, Illinois.

Among the notables present were: Dr. C. F. Burgess, President of the Burgess Battery Company, who gave away a free battery to contestants; Walter Addems, chief test pilot of the United Airlines, who entered his own model with a home-made gas engine. The model flew out of sight. Mr. and Mrs. Stofer of Indianapolis, competed for prizes. Mrs. Stofer's model won over that of her husband. Mr. Vernon Boehle, the 1935 International Moffett Trophy winner, competed for Indianapolis.

The winning flight of 46 minutes and 4 seconds, made by Bernard Johnson, although unofficial, exceeds the present world's record by about 15 minutes. The first model flown was followed by airplane, but was lost to sight. Two models flew over the lake and were picked up by the coast guard and returned uninjured to their owners.

Boston, Massachusetts

The Jordan Marsh-Boston Traveler Junior Aviation League held their first gas model contest last October. Unfortunately there was a stiff wind blowing which did not allow for much time. The winners were:

Marchi with a time of 2 min., 40 sec.; Phillips with 22 seconds; Shea with 17.5 seconds; and Cedrone with 14 seconds.

There were many crack-ups due to the wind. Marchi won the Will Rogers-Wiley Post Memorial Trophy which was donated by Tommy Atkins.

Oklahoma City, Oklahoma

A gas model contest, sponsored by the Oklahoma City Chamber of Commerce and held in conjunction with the State Fair, was given recently by the Oklahoma City Model Airplane Club. An interesting method of flying the ships was used. All the contestants drew numbers for the order in which they were to fly their ships. They were called in order and if they failed to get their ships off the ground in five minutes, it was judged a delayed flight and the next contestant took his place.

Those young men who understand meteorological conditions and wait for the correct moment in which to fly their ships would be very much perturbed at this procedure. In other words, such a system eliminates any knowledge of weather conditions that the contestant may possess. Frankly we do not feel that this is an advisable procedure as it restricts the study of flying conditions.

The contest was won by Dewitt Ross, Jr. of Tulsa, Oklahoma, with a flight of 24 minutes, 55 seconds. We are indebted to Robert C. Smith, president of the model club, for this information.

Columbus, O.

After struggling with gas models for about two years, Robert File of 502 Seymour Avenue, Columbus, Ohio, won the gas model contest held at Norton Field recently. The winning flight was 11 minutes, 11 seconds. The ship climbed to 2000 feet with a motor run of five minutes, the glide lasting 6 minutes, 11 seconds.

Australia

Recently a model built and owned by Mr. T. Milford of Hindmarsh, Australia, flew out of sight while taking part in the Model Aeroplane Association's display at Pooraka Aerodrome, North-road, and was found three days later at Modbury, about twenty-five miles away. It set an Australian record, having climbed to an estimated height of 2500 feet above the aerodrome and flying for thirty minutes.

Notice to I.G.M.A.A. Members

Pins for I.G.M.A.A. members may be obtained by writing to the I.G.M.A.A., Model Airplane News, 551 Fifth Avenue, New York City, and enclosing twenty-five cents to cover the cost of the pin and postage. Only a limited number of pins are being made at present so it is suggested that those who wish pins, write in immediately.

Airways—Here and There

(Continued from page 19)

cross section.

Mr. Gilbert H. Minnigh of South Cumberland, Maryland, Box 2121, Station "E" appears to be a very versatile gentleman. He sends us picture No. 5, which prompts this statement. The picture shows a 36" Lockheed Vega which he built from plans in Model Airplane News. The ship has air wheels, oleo struts, movable controls, complete built-up motor and wing ribs of the girder type, which are exactly like the real ship. The interesting part about this picture is that Minnigh not only took the picture but he painted the background, as shown in the photograph. The painting is made on a 4 x 6 foot piece of Beaverboard, and is most realistic. It appears that artistic characteristics go hand in hand with model building.

An unusual piece of work has been turned out by Bob Stetson of 1349 South Gaylord Street, Denver, Colorado, in the nature of a completely detailed scale Martin Bomber. This is one of the most realistic scale models that we have seen, and altogether is a very ambitious undertaking. Stetson is shown in picture No. 6 holding his model.

Picture No. 7 shows a very fine scale model of the Curtiss "Speed Wing," which was built by Henry Clark of 46 Fort Washington Avenue, New York City. He tells us that the cockpit of the ship has every detail of the big plane. Though it only has a wing span of twelve inches, the scale has been carefully carried out and, because of its detailed workmanship, the model looks very much larger.

It appears that many parents fully realize the value of model airplane building to the education of young men. In fact it has inspired the parent of one of our builders to "break out" in verse. We are sure that readers will appreciate the sentiments embodied in the poem, so we will present it here:

MODEL AIRPLANE NEWS is "The Tops" magazine.
By wide-awake boys everywhere it is seen.
Best models, new kits and expert advice—
Its pages crammed full of everything nice.

Assembling a plane requires patience and will;
Gives balance and poise and engineering skill.
A safe recreation, brings joy and health,
Leads to gainful employment, to fame and to wealth.

The boys who keep busy reading Airplane News,
Haven't time for crap shooting, gang stuff and booze.
Building planes develops brains, trains hands, gives pleasure,
A well-fitted workshop is a boy's safe treasure.

We withhold the name of the poet inasmuch as she has requested us to do so.

During the summer the Megow Model Airplane Shop sponsored a nation-wide prize contest. Over a thousand prizes were offered, the first being a round trip coast-to-coast flight on a regular TWA transport ship. Other prizes comprised several thousand-mile flights, hundreds of model kits, etc. Interest was keyed to a high pitch, the importance of the chief prizes being in the eyes of the young model enthusiast, the height of glory. The results were closely contested, the first prize going finally to Janvier L. O'Hara of Kansas City, Mo., for a new airplane model and a number of valuable suggestions to be incorporated in the building of all airplane models.

Mr. O'Hara has just completed his trip, made in a leisurely manner with stop-overs in Philadelphia, New York, Chicago and other points to inspect their airports with an eye to planning them for the many thousands who are engaged in the hobby of model building. Mr. O'Hara is shown with air line officials in picture No. 8.

One of the youngest merchants in the world lives in San Gabriel, Calif. He is Warren Rapelje of 426 West Las Tunas Drive. He has constructed airplanes since he was 3½ years of age and took his first ride in an airplane when he was five. He is now ten years old. In his work, Rapelje takes care of the business entirely by himself. He is well on the road toward fulfilling his desire of becoming an aeronautical engineer.

The Experimental Air League of 2751 Barnes Avenue, New York City, appears to be a very progressive and active club. They have just published the first issue of a pamphlet which will be printed every three months. It contains general news of the club, humor and instructive items. The league will be pleased to send a copy free of charge to anyone who writes for it.

MODEL NEWS FROM OTHER COUNTRIES

Japan

Mr. Muriichi Kitamura of the Tokyo Japan Model Airplane Association, 5 1-Chome, Kobikicho, Kyobashi, Tokyo, Japan, has been kind enough to send us some pictures and interesting data on model activities in Japan. Picture No. 9 shows the start of a flight of a model plane at Hibija Park, Tokyo. These young men are members of the Kyobashi unit of the Association. Following, Mr. Kitamura presents a short story telling about the development of model airplane building in Japan.

It was about eight years ago that model airplane building started to interest the boys in Nippon and the sport prevailed all over the country in a short time. In the past three years, scale models have also been introduced, and at present, solid models are raising their

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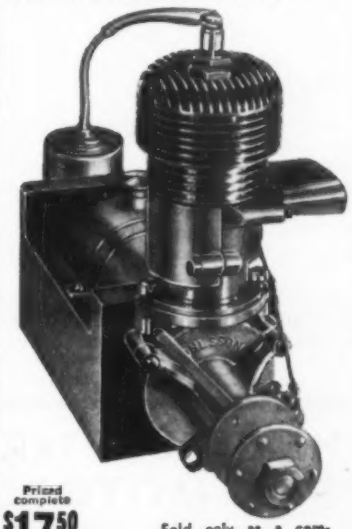

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MODEL BUILDERS
HOW WOULD YOU LIKE TO GO TO AN AERONAUTICAL COLLEGE?
Here Is A Real Opportunity For You To Win Any One Of
100 AWARDS WORTH $2850.00

Get into this Model Plane Contest! 1st and 2nd awards are Scholarships in Aeronautics at the University or College of winner's choice, or the cash, which is, 1st award, $1500; 2nd award $750; and 28 other cash prizes: 3rd, $50; 4th, 5th, 6th, $20 each; 7th, 8th, 9th, 10th, $10 each and 11th to 30th, $5 each—and 70 Martin Bomber Model Kits, value $3.50 each, a total of 100 prizes. In case of ties, duplicate awards will be made.

GET YOUR OFFICIAL CONTEST KIT. ENTER NOW!

You have two models to choose from, a Boeing P26A or a Curtiss Goshawk (illustrated below), or you may buy both and enter both. Each Kit $2.00 and 10c for mailing. (25c West of Denver.) A Tru-Cut Knife is packed in each Contest Kit FREE. Order yours now. Complete rules, entry blank, etc., in each Kit.

BOEING P-26A
Wingspan 21¼", Lt. 18", Wt. 2½ oz. Exact ¾" Scale.

CURTISS GOSHAWK
Wingspan 23¾", Lt. 16¾", Wt. 3⅛ oz. Exact ¾" Scale.

THE RULES ARE SIMPLE

1. Contest is open to everyone.
2. Official Entry Blank must be filled out and mailed.
3. Contestants may incorporate as much detail as desired.
4. Preliminary judging will be from photographs submitted by contestants. Such photographs will not be returned. Name and address of contestants must be shown on back of photographs. The judges will select 100 models from these photographs, which in their opinion attain highest rating. The 100 selected will be asked to send their models to Schenectady, N. Y. for final judging. Models must not be sent until requested.
5. Contest opened Nov. 1, 1936, and closes August 1, 1937.
6. Prizes will be awarded on a basis of general accuracy, detail and quality of workmanship.
7. Models which are awarded 1st to 6th prizes inclusive are to be and become the property of Mohawk Model Planes & Supplies. All other models will be returned to contestants.
8. Judges to be selected by the Mohawk Model Planes & Supplies. Decision of the judges as to all matters is to be final.

MOHAWK MODEL PLANES AND SUPPLIES
P. O. Box 604 Schenectady, N. Y.

MOHAWK MODEL PLANES & SUPPLIES
P. O. Box 604, Schenectady, N.Y.

Please send me.....IDEAL Official Contest Kit(s).
I am enclosing $2.00 for each kit, plus 10c for Post. West of Denver 25c.

Print Name .....

Address .....

City .....State.....

heads with an increasing tendency.

As is the condition in America, a gasoline engine age is likely to come very soon to Nippon. There is a good reason for its rapid improvement in Nippon by reason that assembling small delicate parts requires skillful handwork which is a strong point of Nippon workmen. Furthermore, such small gasoline engines can be produced considerably cheaper as compared with that of foreign makes.

The official flying record of a model airplane contest in Nippon is 21 minutes by a model of 90 c.m. powered by rubber threads. However, several better records of far more than two hours were made at private contests; that they could not be taken as official records is a matter of great regret.

Till last year there were more or less sixty aerial clubs and associations without any controlling organ, which of course, was an undesirable condition for the improvement of such independent organizations.

With the object of placing all the organizations under a powerful party, some twelve old fans, all of whom have more than 20 years experience, made a movement for the establishment of a controlling organ, as a result of which they succeeded in amalgamating with the Dai Nippon Aerial Boys Association headed by Captain T. Tojo.

The Daily Nippon Aerial Boys Association acts and supervises the entire country in connection with aerial study and propagation as well as model airplane enterprise. The official record of model airplane flying is only made at the contest held by this corporation which is held three times a year—spring, summer and autumn, although private contests are held every month, everywhere.

The membership of the Association amounts to several thousand, having more than 200 advisers amongst prominent people of the nation who are listed as honorable members.

It is one of the young members' significant work for the country that a 90 Type ship-bird "Hokoku 84" which, afterward, Naval Minister named "Dai Ichi Jidōgo" (The First Children's Number) was built by the proceeds of waste cigarette tinfoil by patriotic girls and boys.

Holland

An exhibition of model planes was recently held at Amsterdam, Holland, under the direction of the Amsterdam Model Airplane Club of Henr. de Keijserplein 6', Amsterdam (Z) Holland, of which Mr. Y. E. Kreefs is the director. Picture No. 10 shows part of the exhibit. In the picture a model of the Arup Flying Wing is shown which was built from plans in MODEL AIRPLANE NEWS.

Philippine Islands

Though the Philippine Islands are in a remote corner of the globe, this does not prevent them from becoming air-minded. Mr. G. B. Carty sponsors the Manila Model Airplane Club of 730 A. Mabini, Manila, P.I. He writes and tells us of the activities of the builders of this club. A group of members with their planes is shown in picture No. 11. In his letter, which was mailed to us the latter part of October, he says:

"The first club contest is to be held at the beginning of November, just at the start of the good weather here. This will be for fuselage models and we expect to establish a new Philippine record. At present we have twenty-one entries and there probably will be more before the contest opens. It will be run under National Aeronautic Association rules."

One of the difficulties which American builders do not have to contend with is the water-logging of materials, especially balsa, which takes place in the humid atmosphere of the Philippines. Mr. Carty tells us that the models are increased in weight to a considerable extent. Sometimes the humid air which is pent up inside of the doped wing condenses and forms water inside the airfoil and causes the plane to warp. He continues by saying there is almost a total absence of thermals and the plane to fly three minutes must be under power for that length of time. The heat and light in this tropical country also affects the rubber to a considerable extent.

We wish to thank Mr. Carty for this information.

England

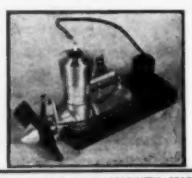
Model builders who attended the 1936 National Model Airplane Competition held at Detroit will undoubtedly remember Mr. Harry York, the English press representative who came over with the English delegation that flew for the Wakefield Trophy. Mr. York's home address is 171 New Kent Road, London, S.E.1. Evidently America left its imprint upon him. In fact we are quite certain of this, for he sends us picture No. 12 which shows the model of the Northrop Pursuit ship which he has recently completed. It is a very neat-looking job and we look forward to further contributions from Mr. York. We are sure that he would be very much interested in having model builders write to him.

Australia

Readers who wish to see a remarkable

HEADQUARTERS FOR MOTORS!

JAY'S MEANS BEST



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FREE! with Every Assembled Motor a FREE PROPELLER

PROPELLERS—Most efficient gas model propellers on the market! Make your ship perform better—PINE—12", 13", 14"—$1.00. MAHOGANY—12", 13", 14"—$1.25.

AIRWHEELS for gas models—3¼" or 3½" diam.—$1.50 pr.

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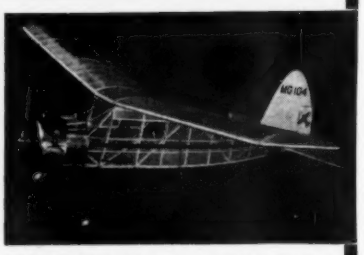

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—1 HR. 47 MIN. GAS MODEL

Span—6 ft. Weight—complete with motor—3 lbs. Here is a model that will give you everything you want in a gas model!—Looks! Strength! Light weight! Real performance! The Kit for this famous model is complete in every detail—real air-wheels, finished aluminum cowl, cut-out ribs, ½ pt. cement, 1 qt. dope, silk covering, as well as plenty of wood, metals, etc., to build the best looking, finest performing gas model you ever saw! Complete kit with full size plans and instructions..... $10.00 Postpaid

Plans, wing ribs and spars only.....$3.75

HERE IS A REAL SPECIAL!—DENNYPLANE JR. KIT and GWINAERO or DENNY SKYCHARGER Motor—all for $25.00! You save $2.50!

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18" BALSA SHEETS
1/32x2 ..... 3 for 5c
1/16x2 ..... 5 for 5c
3/32x2 ..... 3 for 5c
⅛x2 ..... 3 for 5c
3/16x2 ..... 3 for 5c
¼x2 ..... 1 for 5c
½x2 ..... 1 for 7c
For 36" Sheets, double above prices.

BALSA PROP BLOCKS
¼x¾x6 ..... 4 for 5c
½x¾x5 ..... 5 for 5c
⅝x1x8 ..... 2 for 5c
¾x1x8 ..... 2 for 5c
¾x1¼x12 ..... 1 for 6c
1x1½x12 ..... 1 for 8c
1x1½x15 ..... 1 for 9c
For 36" lengths double above prices and add 10c postage

15" BAMBOO
1/16x¼..6 for 5c
Shredded..40, 5c
Japanese Tissue All colors, dz. 16c
Silver or Super-fine Tissue..5c Doz. 50c
20"x24" Thinner Best 1 oz. 5c

18" BALSA STRIPS
1/16x1/16 ..... 20 for 5c
1/16x⅛ ..... 16 for 5c
1/16x¼ ..... 10 for 5c
1/16x3/16 ..... 15 for 5c
1/16x¼ ..... 14 for 5c
3/32x3/32 ..... 12 for 5c
⅛x¼ ..... 7 for 5c
¼x¼ ..... 3 for 5c
¼x½ ..... 2 for 5c
½x½ ..... 2 for 5c

18" BALSA PLANKS
1x1, 1 for 9c
1x2, 1 for 15c
2x2, 1 for 22c
2x3, 1 for 26c
2x4, 1 for 45c
2x6, 1 for 65c
Postage prepaid on orders over 75c. West of Mississippi add 10c extra. Canada: add 15c extra on orders under $1.00. On orders over $1.00 add 15%. CASH OR MONEY ORDER—NO STAMPS—NO C. O. D.'s.

Sheet Celluloid
2x6 ..... 2c
6x8 ..... 4c
12x16 ..... 15c

Clear Dope
1 oz. 10c
½ pt. 25c

Colored Dope
1 oz. 10c
½ pt. 30c

Clear Cement
1 oz. 10c
½ pt. 25c
1 pt. 45c

Wood Veneer
20x30", 1 for 9c
2 for 17c

Reeds 10c
1/32, 1/16" ..... 3 ft. 1c
⅛" ..... 3 for 2c

Wooden Wheels
½", 2 pair 3c
⅝", pair 2c
1", pair 4c
1⅜", pair 4c
1¾", pair 7c

Celluloid Wheels
⅜", pair 5c
½", pair 7c
1⅜", pair 9c
1⅞", pair 15c

Balsa Balloon Wheels
½", 2 pair 3c
⅝", pair 2c
1", pair 3c
1⅜", pair 5c
2", pair 8c
3", pair 14c

PROP. SHAFTS
2 for 1c

PAUL-O-WINA JAP PROPS
5" 10c
(add 5c per inch for props up to 10".)

Machine Props
5" 4c
(add 1c per inch for props up to 10".)

Rubber Motors
1/16 sq. 20 ft. 5c
⅛ flat 20 ft. 5c

INSIGNIAS—French, American, English, German
1¼"..4 for 3c
2"..... 1c
1 sheet of 24, 5c

Dummy Radial Engines
1½" Diam. 14c
2" Diam. 18c
3" Diam. 23c

DOWELS, 1/16x12 10c per doz.

SPOT WELDED HOLLOW ALUMINUM WHEELS
1" ..... pr. 6c
1⅜" ..... pr. 11c
1⅞" ..... pr. 14c

Sheet Aluminum .003....sq. ft. 10c

Alum. Tubing 1/16", 3/16", ¼" ..... 10c ft.

ALUM. LEAF, 2 sheets for 1c

WIRE, 6 ft. 3c 36" lengths.

NOSE PLUGS, large 10c doz. small....5c doz.

Miscellaneous Washers, ¼", ⅛ doz. 1c

Sandpaper, pkg. 5c

Model Pins, pkg. 5c

Brushes No. 6 5c

Thrust bearings 1c

Bushings, doz. 3c

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piece of work should look at picture No. 13. This shows Howard H. Taylor of 21 Walter Street, Claremont, Perth, Western Australia, and his uncovered model of the Northrop "Sky Chief" which he built. All structural details are included in this ship. You will note the small extended ailerons at the tops of the wings. The parts of the model have been made from sheet balsa. The wheels have shock absorbers and the wings are detachable. Many other details are included. The plane weighs 2¼ pounds uncovered. Mr. Taylor hopes to fly his ship very shortly. The ship was made from plans drawn up by Mr. Taylor with the necessary changes for a flying model from plans which appeared in MODEL AIRPLANE NEWS.

Mr. Ivor Freshman of 67 Liverpool Street, Sydney, Australia, has been kind enough to send us picture No. 14 which shows Mr. L. H. Lymath of the Sydney unit of the Model Flying Club of Australia with his Gloster Gladiator flying scale model. Do not mistake the buckle on Mr. Lymath's belt for an extended radiator below the fuselage. Mr. Freshman hopes that the United States will send a team of model fliers to the National Competition which will be held in Sydney in March, 1938. This may seem a long way off but plenty of time will be needed in preparation for such a trip. Model builders who may be considering making such a trip should write Mr. Grant, the editor of MODEL AIRPLANE NEWS.

South Africa

Mr. R. W. Hill of Cape Town, South Africa, P.O. Box 1906, writes us of the great increase in activities among model builders of that country. He says:

"Model airplane building is a new hobby in South Africa, but is progressing now with such rapidity that I should not be surprised if you receive a few entries for the next meet of the Wakefield Trophy.

"It might be of interest to you if I give a few details of flights made so far.

"Mr. DuPlessis, a boy of 17 years of age, built a Bob Field Glider which was launched, allowing 30 feet of tow line, and flew for 53 minutes before touching the ground. The model was lost to sight in the clouds on several occasions but was fortunately seen again.

"Mr. Lilly, a gentleman of 50 years of age, flew an endurance model which was never seen again. Another model of his, of the same machine, flew for 15 minutes.

"I built a gas model of my own design of 5'1" wing span which flew for 15 minutes on ⅛ oz. gasoline, reaching a height of 1,500 feet. The model was powered with a 'Baby Cyclone.' "

CLUB NEWS

Monessen, Pa.

Mr. Carl F. Pehl of 113 Second & Boys Streets, Monessen, Pa., who is a licensed pilot, writes us telling of his interest in models and their value in studying aeronautics. Because of his interest in the sport, he recently held a contest which was primarily for Boy Scouts. There were various types of events, flying and non-flying, so that all had a chance to compete. Free rides in a 1936 Taylor Cub were offered as prizes with the alternative of one year subscriptions to MODEL AIRPLANE NEWS. Believe it or not, all the boys took MODEL AIRPLANE NEWS as prizes.

Marshalltown, Iowa

We hear from Mr. Wallace R. Blake, president of the Ace Model Club of Marshalltown, Iowa. He tells us of one of their first contests which was held recently. There were twenty-two contestants from all over Iowa. Thirty-inch endurance models were used by each contestant. Anyone under eighteen years of age could enter. Clifford Ray of Fort Des Moines was first with a flight of 2 min., 22 seconds, and David Tyrell of Marshalltown was second with 1 min. 11 sec. Gas engines were given as prizes. There were about 1500 spectators present and Mr. Blake says that this is the first contest of its kind in several years and it was a great success.

Picture No. 15 shows some of the contestants in action.

Cornwall, New York

A new club has been organized at the Cornwall High School, Cornwall, New York. It appears to have begun with a "bang," for fifty-five boys applied for membership as soon as the existence of the club was announced. However, due to the limited facilities, only twenty-five members of high school age could be accepted. Picture No. 16 shows a group of the club members. From their letter which we received recently, we judge that these young men are live-wire model enthusiasts. Though no models appear in the picture, there are plenty in the embryo stages, in the young men's minds. They promise that it will not be long before they will be able to send us information concerning their model flying activities. We are indebted for this information to Mr. Walter J. Calhoun, Jr., faculty advisor of the Cornwall High School Model Airplane Club.

Rockford, Illinois

A new chapter of the National Aeronautic Association has been formed at Rockford, Illinois. Mr. Harry Soper Jr., of 2317 West State Street, tells us that this chapter is planning a state indoor contest to be held in March, 1937, in the new National Guard Armory. Those who wish information concerning this contest should write to Dr. Spickerman, Rockford Chamber of Commerce, Rockford, Illinois.

Mr. Soper also tells us that a gas model club is being organized in this territory. Anyone interested in joining this club should write to either Harry Soper Jr., Pla-Mor Sport Shop, Rockford, Illinois, or Conrad Hansen, Y.M.C.A., Beloit, Wisconsin.

Lancaster, Pa.

An Aero Club Ground School, under the direction of Jesse Jones, has recently been started at the Lancaster Municipal Airport, Lancaster, Pa. Here is a chance for young men in that vicinity to get acquainted with "old man aviation."

The IDEAL Super Detail Martin Bomber

Wing Span 35". Length 22½". Weight 4⅝ oz. ½" Scale.

Beautifully designed and strikingly colored in high lustre Olive Drab and Yellow. Has all the "Super-Detail" features and many exclusive fittings such as cockpit operated controls, retractable landing gear, rotating gun turret, moveable machine guns, streamline cowlings and two types of three-bladed propellers. Kit contains all parts and materials, with many fully finished items ready to use. Complete Kit **$3.50**

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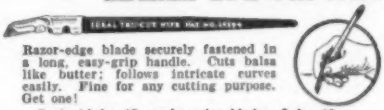

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New York City

Any young man who wishes to join a model airplane club in the Bronx, New York, should write to Irving Pearlman of 2076 Belmont Avenue, New York City. He is at present organizing a club to carry on model activities in his neighborhood.

Boston, Mass.

The Junior Aviation League of Boston, Mass., has been busily preparing their indoor ships for possible contests. Several official indoor local records have been made. In the Fuselage R.O.G. Class C Junior, Mr. Golden established a time of 7 min. 51 sec. Mr. Walen, with a time of 14 min. 8.8 sec., leads the Class C Stick group. Mr. Marchi has set the ball rolling in the Helicopter Open Class with a time of seven seconds. This is a Boston record.

Brooklyn, New York Contest

The third annual outdoor meet of the Airplane Model Builders Exchange, nicknamed "Tambe," was held at Marine Park, Brooklyn, New York, on Sunday, Sept. 6. The contest was directed by Mr. David Lynn, director of the club and 300 model airplane builders attended the competition.

The events were: Hand launched gliders, stick model, cabin, speed and high point scorer. For each one of these events trophies were awarded. The judges were David Lynn, Irwin S. Polk, head of the Metropolitan Model League; Angelo Cardiello, Harry Murray of the Sperry Gyro Company, and Arthur Lesselbaum, president of the club, who also assisted Mr. Lynn in directing the contest.

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Designing Your Speed Model

(Continued from page 17)

plane from flying a straight course. This is a fact that can be easily demonstrated, though it may be hard to believe.

When a large fin is used it holds the plane firmly on its course but this course is a left hand circle due to the banking of the ship caused by the propeller torque reaction. If a fin is used which is too small, then the tail of the plane will be swung to the left due to the gyroscopic reaction of the propeller, the fin area being too small to keep the fin parallel with the line of flight. This causes the model to turn in a circle to the right. Many model fliers may recall some incident to mind in which his plane, when making a take-off from the ground would lean over or bank to the left yet the tail would swing to the left and the ship nose around to the right. This is due to the fact that the fin is so small that it is ineffective at the start of the flight when the ship is rolling slowly before it attains take-off speed.

Because of these conditions the selection of the proper amount of fin area for a speed model is a delicate problem.

Amount of Fin Area to Use

It is the problem of the speed model designer to find the "happy medium" value of fin area, between too large and too little area, which will allow just enough tail swing to the left, causing a tendency to turn the plane to the right, to balance the torque reaction's tendency to bank and turn the plane to the left. If just the right amount of area is used the model will fly on a perfectly straight course.

For an average model the general rule for the amount of fin area, when the fin moment arm is equal to one-half the wing span is; *make the fin area equal to about 12% of the wing area and not less than 10% of it.*

Usually if the minimum value of 10% is used on the *average* model the plane will have the critical balance longitudinally which will induce it to fly a straight course as mentioned above. However in the case of this speed model the design of which is being developed here, the moment arm is 75% of the wing span, or 50% longer than the normal condition. Therefore due to this the fin area should be only 2/3 as large as in the average case if the nose of the plane is fairly short, or about 6 2/3% of the wing area. This would be correct if an average size propeller is used, but on a speed model the propeller has more than the normal amount of blade area. This large projected side area of the propeller, located ahead of the center of gravity must be balanced by a corresponding amount of lateral surface area to the rear of the C.G. Therefore the fin should be slightly larger in size to insure the existence of this condition. About 20% additional fin area will be sufficient. Thus 6 2/3% plus 20% of 6 2/3% gives a value of 8%. However when speed models have long noses, as in this case, more fin area should be used to compensate for it. Therefore about 25% more area should be used.

This means that the fin area on the average speed model should be equal to about 8% + 2% or 10% of the wing area. This is the same value as the minimum amount to be used on the average fuselage model. If this amount of area is used and the plane banks and turns to the left when a propeller is used which turns clockwise (looking at it from the *tail* of the airplane), then the fin area should be reduced slightly, until the area is such that the ship flies a straight course.

This small amount of fin area is necessary on a speed plane in order to have it function successfully as a speed ship, even though its stability may be sacrificed. The ability of a speed plane to make a successful steady flight must depend on the fact that it is able to *resist* disturbing influences because of its weight and small surfaces, rather than upon its quality of *recovering* its balance because of large surfaces, after it has been displaced from its normal flight attitude.

Though the fin area of a speed model should be about 10% of the wing area in average cases, this amount will not be quite large enough if pants are used on the wheels and if the landing gear struts are faired in or are quite wide, as in the case of this plane which we are designing. When wide struts and pants are used greater vertical area exists in front of the center of gravity, therefore 20% fin area must be added to compensate for this condition. The final amount of fin area then should be

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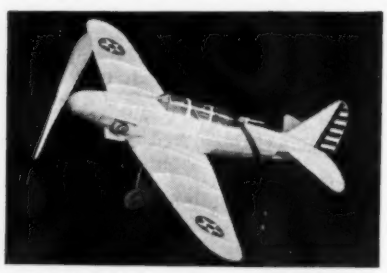

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(10% + 2%) or 12% of the wing area. The area of the fin should be, therefore, 12% of 53 inches or 6.36 square inches.

Under these conditions a speed plane is critically balanced and its flight adjustments are delicate, though the long tail moment arm helps to reduce the sensitiveness to adjustments of the surfaces.

Fin Area Formula

Readers more technically inclined and who wish to follow a more precise method of determining the fin area may calculate the area required by means of the following formula, which has been used previously in part to determine the fin area required for average fuselage models:

$$a_F = a_F\left(\frac{D}{S}\right)+(0.067)\left(\frac{A}{M}\right)$$

times $(3+N+0.58\sqrt{STr})$.

In the formula; A_F represents required fin area, D = propeller diameter, S = span of wing, A = area of wing, M = fin moment arm, N = length of the nose and T_r = the amount each wing tip is raised above the center point of the wing.

Now, substituting the values for our speed plane in the formula for the various quantities we have:

$$a_F = a_F\left(\frac{8}{20}\right)+0.067\left(\frac{53}{15}\right)$$

times $(3+7.5+0.58\sqrt{20\times1.67})$.

Then,

$$a_F = a_F(0.4)+0.067(3.53)(13.85),$$

or $a_F = 5.46$ sq. in.

An additional 20% of area must be added to this amount in order to compensate for the wide struts and pants. The correct amount of fin area for this model will be then (5.46 + 1.09), or *6.55 square inches*. This is very close to the value of 6.36 square inches which was determined by means of the general rule. Actually 6.36 square inches is 12.4% of the wing area.

Amount of Stabilizer Area

Obviously, for efficiency's sake, the stabilizer area should be as small as possible. However this area must be large enough to insure a steady flight regardless of efficiency considerations. In average cases the general rule specifies that the stabilizer area should be equal to 33 1/3% of the wing area. The same reasoning holds true here as in the case of the fin area. The long moment arm indicates that less stabilizer area may be used, but the long nose and large propeller will require more stabilizer area to overcome their unstable influence. Also the C.L. and C.G. are close together and therefore no pendulum effect exists to help stability. This more than over-balance: the helpful effect of the long moment arm, so the speed model stabilizer should be larger than one used on an average model, unless the model is of the short nose type. An area equal to 38% of the wing area should be sufficient. As the wing area of our speed job is to be 53 square inches, the stabilizer should have an area of (0.38 x 53) or 20.1 square inches.

In this type of model the difference in angle between the wing and the stabilizer should be (½° to 1°). The higher the line of thrust is located, the greater the angle should be when the model is of the low wing type. In this case an angular difference of one degree will be used as a high thrust line will allow a short low resistance landing gear. The wing is to be set at zero degrees angle of incidence, the stabilizer then should be set at minus one degree angle of incidence.

Stabilizer Area Formula

A more exact method of calculating the stabilizer area is by means of the regular formula which takes into account all the stability characteristics of the model. It is as follows:

$$a_s = (a_s)\left(\frac{D}{S}\right)+(0.67)\left(\frac{A}{3M}\right)(2C+N)\left[1-\left(\frac{Q+\frac{2X}{M}-2}{5}\right)\right]\left(1-\frac{(G+2T)}{4C}\right).$$

In the formula A_s represents the required stabilizer area; D = the propeller diameter, = 8 inches; S = the span of the wing, = 20 inches; A = the wing area, = 53 square inches; M = the stabilizer moment arm, = 15 inches; C = the chord of the wing, = 3½ inches; N = the length of the nose of the model, from the center of the wing to the rear face of the propeller hub, = 7½ inches; Q = the angular difference between the wing and the stabilizer, = 1 degree; X = the upward distance from the line of thrust to the wing center section, = (— 1 5/16) inches or — 1.31 inches, (quantity is *minus* as the line of thrust is *above* the center section); G = the distance from the center of gravity to the center section of the wing

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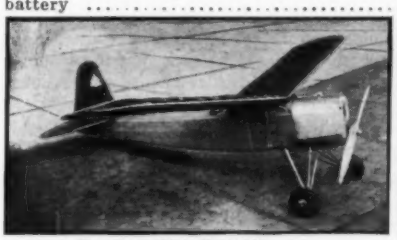

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$= (-9/16)$ inches or (-0.65) inches; T = the upward distance from the C.G. to the line of thrust, = 0.75 inches.

Substituting these values in the formula we have:

$$a_s = (a_s)\left(\frac{8}{20}\right)+0.67\left(\frac{53}{45}\right)(7+7.5)\left[1-\left(\frac{1+\left(\frac{-2.62}{15}\right)-2}{5}\right)\right]\left(1-\frac{(-0.56+1.5)}{14}\right).$$

Simplifying and solving for the value of A_s we have:

$A_s = 22.1$ square inches, which is the correct stabilizer area to use for complete stability; that is the proper area to produce quick recovery from displacements. By figuring the percentage of stabilizer area to wing area, we find that it is exactly 41.8% of the wing area. This large area is required chiefly because of the small angle between the wing and stabilizer. Comparing the answer with the value specified for stabilizer area though application of the *general rule*, we see that it is about 4% greater. Actually this amount of area will provide a high degree of recovery ability, which is not necessary in this type of model because of its weight and speed. The stability may be sacrificed slightly for the sake of efficiency. Therefore the area may be reduced to about 35% of the wing area and thereby have sufficient stability with added efficiency.

Shape of Fin

The tail areas having been determined, the next step is to lay out on your diagram a gracefully shaped fin that embraces the correct amount of area. The fin should be located at the rear end of the fuselage and should be proportioned so that its heighth is equal approximately to its length. A speed model fin never should be tall, as this type will give greater resistance than one of the proportions suggested above.

Landing Gear

The landing gear now should be designed. First of all its length should be determined. The distance from the thrust line to the bottom of the wheels should be equal to 60% of the propeller diameter, at least. If the wheels are located close to the propeller this value will be large enough, but if the nose is long and the landing gear is located a considerable distance back of the propeller, then it should be longer. In such cases the length of the landing gear should be about 67%, or 2/3 of the propeller diameter.

As this model is liable to be quite tail heavy due to the heavy rubber motor that will extend rearward to the tail, the landing gear should be located well forward in order to balance the motor weight in spite of the fact that the nose of the model is long. Therefore a value of 60% of the propeller diameter, or 4.8 inches should be the distance from the thrust line to the bottom of the wheels (ground line).

A compensating weight placed ahead of the C.G. at the nose of the ship also helps to lighten the tail. The landing gear may be useful in this respect. Also, the nearer to the nose it is located the more effective it will be. If it is located 2 inches from the rear face of the propeller in this case, it will be effective, yet it will be back far enough to prevent the wheels or their "pants" from interfering with the propeller. (Fig. No. 123).

The projected lateral area of the landing gear will affect the position of the C.L.A. However in this type of model the wheels will have pants to streamline them which will help to lower the C.L.A. Therefore the C.L.A. need not be considered when working out the type or shape of your landing gear. The only factor that should guide you is *efficiency*. The construction and shape should be such that the landing gear gives as little resistance as possible. Streamline it carefully.

The weight of the landing gear should be such that it balances the whole model at the desired position of the C.G. As the motor will be heavy and as it passes above the C.G. the landing gear should be heavy enough to balance it. The body and wing weights will be pretty well centralized at the C.G. so it will not be necessary to consider their effects.

If the landing gear is made so that it is about *one-quarter* the weight of the propeller and motor it will weigh about the correct amount, for the C.G. of the landing gear will be about four times as far below the model's C.G. as the motor will be above it. The motor and propeller therefore should be weighed and the landing gear designed to weigh about ¼ of their weight, which will be probably about ¾ ounces.

Center of Lateral Area

Next the center of lateral area should be established at the desired point by drawing in the top line of the fuselage at the correct distance above the line of thrust. First of all the point at the C.L.A. as located should be on a horizontal line through the center of gravity and about 3" to the rear of it. How far to the rear of it it will be, depends on the value of fin area used. This establishes its location horizontally.

However the method of locating the C.L.A. at the point which you have chosen for it (C.L.A., Fig. No. 123), used in the explanation of stability model design, should be applied in the case of your speed model. This method follows the procedure of locating the top line of the fuselage so that the C.L.A. will be at the desired point. (See page No. 39 of the October, 1936 issue.) A silhouette of the side view of the model is employed to accomplish this.

Rubber Motor

The rubber motor in a speed model, obviously must be as powerful as the ship can carry without increasing the motor diameter to such an extent that the number of possible turns are reduced below the required amount. This model should be powered with a motor of about 20 to 24 strands of 3/16" wide flat rubber, and the structure should be designed to stand the stresses developed by a motor of this power. The exact number of strands to use in order to develop any desired amount of motor torque (not propeller torque) may be determined by means of the formulae given in chapter No. 4 of this series of articles, dealing with Rubber Motors. The propeller on this model is properly designed for any number of strands you may wish to use.

The final balancing of the model may be accomplished by making the motor the proper length. If the model is tail heavy the motor may be shortened, the rear hook being placed ahead of the stabilizer. If the model is nose heavy, the motor should be extended the full length of the fuselage. By hanging the motor over the fuselage and moving it backward or forward until the machine balances at the required C.G. point, the point at which the center of the motor should be, may be located. Thus the full length of the motor may be determined.

Outlines of the Model

In laying out the general design of the model all of the facts discussed concerning the efficiency and stability should be carefully considered and embodied in the design. The contour of the outlines should be streamlined to the highest degree, as shown in the Fig. No. 123.

When determining the type of material to be used in each part the designer should keep the idea of proper balance of the ship in mind. Always try to keep the tail light and the nose heavy. For instance a hard wood propeller will give the strength needed to absorb the high power of the motor and at the same time its weight will help to balance the heavy tail with which speed ships often are afflicted.

Next month an outline of the requirements and the qualities required of distance models will be given.

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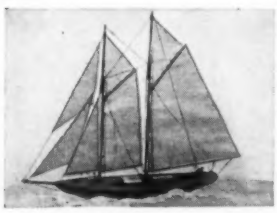

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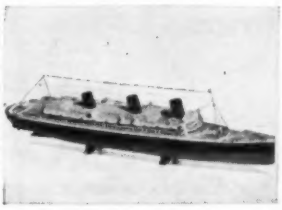

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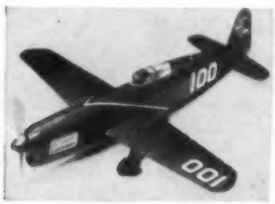

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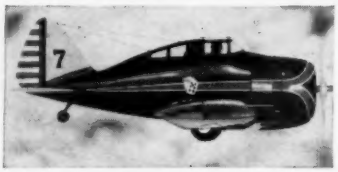

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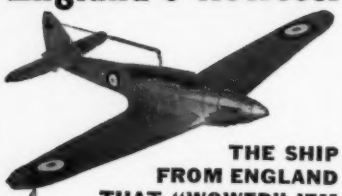

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